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Supplement 71

Diseases of Cereal and Forage Crops

In the United States in 1928

September 1, 1929



BUREAU OF
PLANT INDUSTRY
UNITED STATES DEPARTMENT OF AGRICULTURE

DISEASES OF CEREAL AND FORAGE CROPS IN THE UNITED STATES IN 1928

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Supplement 71

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I N T R O D U C T I O N

The following report has been prepared in the same manner as have those that have preceded it. It is based chiefly on reports of the Plant Disease Survey collaborators. Members of the Office of Cereal Crops and Diseases, particularly E. B. Mains, who reported on leaf rusts, and Hurley Fellows, who prepared a statement on the wheat foot rots, have also furnished information.

Special surveys were made during the year in West Virginia and Montana and further details concerning the cereal disease situation in those states can be obtained from the reports of those surveys (Pl. Dis. Reprtr. Suppls.)

DISEASES OF CEREAL CROPSWHEATSTINKING SMUT OR BUNT, *TILLETIA TRITICI* AND *T. LAEVIS*

Bunt continued to be more prevalent than usual in Pennsylvania, Delaware, Maryland, Michigan, Wisconsin, and Minnesota. The states of North Carolina, Iowa, and Utah reported about average amounts and the remainder of those reporting mentioned it as less prevalent than normal. The only states reporting more than last year were Maryland, Wisconsin, Minnesota, Iowa, and Utah. In general, a reduction in the prevalence and severity of bunt was indicated. This was particularly true for the Middle Atlantic States where bunt has been of outstanding importance during the last few years and for the Pacific Northwest. Several collaborators attribute the reduction to weather favorable for seeding and rapid germination in the fall of 1927, and unfavorable for bunt infection and development. Undoubtedly the large amount of seed treatment that was accomplished was also an important factor.

Table 63. Percentage loss from bunt of wheat as estimated by collaborators, 1928.

Percentage: loss :		Percentage: loss :	
States reporting		States reporting	
4	: Pennsylvania, Maryland	1	: New York, Ohio,
	: Virginia, North Caro-		: Michigan, Minnesota
3	: lina, Colorado, Arizona	.5	: Indiana, Wisconsin,
	: Utah, Oregon		: Texas, California
2.86	: Kansas	.2	: Iowa
2	: Delaware, North Dakota,		
	: Washington		
1.1	: Montana		

It is of interest to note some of the highest percentages of bunt that were observed and reported by collaborators. In a demonstration field in Ford County, Kansas, 74 per cent infected heads occurred in untreated seed. In Pennsylvania, 61 per cent was observed, in North Dakota and Colorado 60 per cent, New York 35 per cent, Maryland 25 per cent, Minnesota and South Dakota 20 per cent, Delaware and Iowa 8 per cent, Wisconsin 2 per cent, Missouri 1 per cent, and Illinois only 0.3 per cent.

In addition to making estimates on losses in yield several collaborators estimated losses on account of dockage as follows: Maryland 4 per cent, North Carolina and Utah 1 per cent, North Dakota, 0.5 per cent, Wisconsin and Kansas 0.3 per cent.

Wheat - Bunt

As usual, the most prevalent species of *Tilletia* was *T. laevis*. Collaborators in Massachusetts, New York, Pennsylvania, Virginia, West Virginia, Illinois, North Dakota, Kansas, and Colorado all reported this species and stated that *T. tritici* was not observed. In Montana, P. A. Young found that the smooth-spored species, *T. laevis*, was by far the more common. Out of specimens from 56 fields of winter wheat that he examined microscopically, only three showed *T. tritici*.

From Pennsylvania, R. S. Kirby reported on the prevalence of bunt in treated and untreated fields:

"Untreated fields - Bunt occurred in 75 out of 87 surveyed or 86.2 per cent of the fields. Average 4.94 per cent.

"In fields planted with seed that was treated with 18 to 20 per cent copper carbonate, bunt occurred in 7 out of 15 fields, or 46.7 per cent of the fields, surveyed. Average infection .337 per cent.

"In fields planted with seed that was treated with 55 per cent copper carbonate bunt occurred in 7 out of the 52 fields surveyed, or 13.4 per cent of the fields. The total amount of bunt in the 52 fields was 10 bunted wheat heads in several fields and 12 bunted wheat heads in one field where the grower had shoveled the dust into the wheat instead of using a treating machine."

The situation in Montana is reviewed by P. A. Young in Pl. Dis. Reporter Supplement 69: 115-119. May 15, 1929.

In Maryland it was estimated by Jehle that about 211,000 bushels of seed were treated. This was enough for one-third of the acreage. In Virginia, S. A. Wingard reported as follows:

"The copper carbonate treatment for bunt, I believe, will eventually solve the bunt problem in Virginia. This treatment is being used extensively in Virginia and the growers are getting splendid results. The millers of the state are cooperating with the county agents. Many mills have put in treating machines. Our records show that 28,000 pounds of copper carbonate were used for treating seed wheat in 1927 and 17,525 pounds for the 1928 crop. Our records for 1928 were not so complete as for 1927. I think there was considerably more dust used in 1928 than was reported to us."

Brentzel in North Dakota reported Hope and a few hybrids as very resistant. The Section of Plant Pathology, Minnesota Agricultural Experiment Station, reported Marquis as resistant and Kota and Preston susceptible. Field observations of the Illinois Natural History Survey showed the following order of susceptibility:

Kanred 0.3 per cent, Fultz 0.05 per cent, Red Wave, trace. The percentage figures are the average per cent of bunt found in the particular variety. The same applies to the Pennsylvania figures, as follows: Berkley Rock (0), Pennsylvania 44 (2.4), Purkoff (resistant), Fulcaster (8.3), Fultz (3.2), Red Rock (very susceptible), Leap (7.6), Forward (8.3).

Recent literature

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2. Fromme, F. D. The effect of washing the seed on infection of wheat by stinking smut. Phytopath. 18: 711-713. Aug. 1928.
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12. Sampson, K., and D. W. Davies. The germination and early growth of wheat treated with copper carbonate and tillantin R. Ann. Appl. Biol. 15: 403-422. Aug. 1928.

Wheat - Bunt

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15. Tapke, V. F. Wheat stinking smut control by copper carbonate method. U. S. Dept. Agr. Yearbook 1927: 707-708. 1928.
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LOOSE SMUT, *USTILAGO TRITICI* (PERS.) ROSTR.

Of the twenty-five states reporting loose smut, fourteen collaborators mentioned it as about as prevalent as last year, four reported less, and only three reported more than last year. The reports would indicate that prevalence in general was somewhat below the average. The following are a few of the more comprehensive reports of collaborators:

New York: Sixty-seven fields in western New York were examined on a recent trip. The disease never occurred in more than amounts of one per cent, which was found in 1 field two miles west of Savannah in Wayne County and in 1 field two miles south of Sodus, Wayne County. A trace of it occurred in six other countries. (Horsfall)

Pennsylvania: Found in 98 per cent of the 154 fields examined. Occurrence in 36 fields Forward .13 per cent; in 51 fields Leap .39 per cent; in 33 fields Pennsylvania 44 2.61 per cent; in 6 fields Fulcaster 3.40 per cent. (Kirby)

Delaware: Very troublesome in some sections of Sussex County with fields showing 5 to 8 per cent. In other sections of the state the disease was less common. (J. F. Adams)

Virginia: Inspectors for the Virginia Crop Improvement Association inspected 2,706 acres of wheat in the state and rejected 325 acres on account of loose smut infection which ran 1 per cent or over for the crop. The percentage of loose smut infection in 9 fields averaging 10 to 45 acres ran as follows: 2.0, 1.6, 1.2, 5.0, 3.0, 2.0, 1.0, 1.0, 2.0. V.P.I. 112 showed the greatest susceptibility to loose smut infection.

The wheat inspected by the Virginia Crop Improvement Association was being grown by men who were desirous of having their grain certified for seed purposes and for that reason one should expect their crops to run lower in loose smut infection

Wheat - Loose smut

than those of the average farmer. Some of the certified wheat growers treat with hot water but the method is too difficult for the average grower. (Wingard)

Table 64. Percentage losses from loose smut of wheat as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss	States reporting	loss	States reporting
2.5	Virginia		Minnesota, Iowa,
			Missouri
2	Michigan, North Dakota,		
	Utah	.5	Maryland, Indiana
1.5	Pennsylvania	.4	Illinois
1	North Carolina, Ohio,	.3	Arizona

Varietal susceptibility was reported as follows:

Table 65. Data on susceptibility of wheat varieties to loose smut as compiled from collaborators' reports, 1928.

Varieties	Varieties	Varieties	Varieties
very resistant:	resistant	susceptible	very susceptible
Leap (1)	Forward (1)	Pennsylvania 44(1)	Red Rock (1)
Gold Coin (1)		Fulz (, 3)	Dawson (1)
Progress (4)		Fulcaster (1)	V.P.I. 112 (2)
Marquis (5)		Marquis (3)	Valley (3),
Pentad (5)		Red Wave (3)	Ill. No. 1 (3)
		Turkey (3)	Kanred (3)
		Kota (5)	
		Reward (5)	

Numerals indicate states and collaborators from which data were received, as follows:

- (1) R. S. Kirby, Pennsylvania.
- (2) S. A. Wingard, Virginia.
- (3) G. L. Stout, Illinois.
- (4) R. E. Vaughan, Wisconsin.
- (5) Section of Plant Pathology, Agricultural Experiment Station, Minnesota.

Recent literature

1. Tapke, V. F. The role of humidity in the life cycle, distribution, and control of the loose smut fungus of wheat. (Abstract) Phytopath. 19: 103. Jan. 1929.

Wheat - Loose smut

2. Kliusknikova, E. S. (Le mycelium de l'*Ustilago tritici*, son extension dans les tissus du froment, et les altérations qu'il provoque dans la structure de la plante nourricière.) *Bolezni Rast. (Morbi Plant.)* 16: 1-25. 1928.
3. Kourssanow, A. L. De l'influence de l'*Ustilago tritici* sur les fonctions physiologiques du froment. *Rev. Gén. Bot.* 40: 277-302, 343-371. May, June 1928.

FLAG SMUT, *UROCYSTIS TRITICI* KOERN.

No flag smut was reported in 1928. P. A. Glenn reported that he had made a limited number of observations in wheat fields in the formerly infested territory of Illinois, but that none of the disease was seen. Leonard Haseman of Missouri stated that no special scouting was done and that no flag smut was seen or reported as far as he knew.

The following counties are those from which flag smut has been reported at some time in the past:

Illinois: Madison, St. Clair, Monroe, Washington, Jersey, Macoupin, Greene, Scott, Logan, and Hancock.

Missouri: St. Louis, St. Charles, Warren, Platte, and Buchanan.

Kansas: Leavenworth, Atchison, and Wyandotte.

STEM RUST, *PUCCINI GRAMINIS* PERS.

In prevalence and severity stem rust was unusually slight. Of the 19 states reporting on prevalence the majority reported less than normal, while only two, Maryland and Virginia, estimated more than the average. All of the states in the barberry eradication area, excepting Ohio, reported less, and the important spring wheat states, Minnesota and the Dakotas, reported much less. Losses were estimated as in table 66.

Table 66. Percentage losses from stem rust of wheat as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss	States reporting	loss	States reporting
11	: Arizona	.25	: Ohio
2	: Minnesota, Wyoming,	.2	: Utah
	: California		
		trace	: Pennsylvania, North
1.5	: Maryland		: Carolina, Indiana, I
1	: Texas		: Illinois, Michigan
			: Missouri, South Dakota,
.5	: Virginia, Wisconsin,		: Nebraska, Kansas,
	: North Dakota		: Colorado, Washington

Wheat - Stem rust

A few collaborators' remarks on the general situation follow:

Pennsylvania: Found in only 5 out of the 154 wheat fields surveyed or 3.2 per cent of the fields surveyed. Average percentage of infection .09 per cent. (R. S. Kirby)

West Virginia: First appeared in extreme southern counties during early July and at this time the initial infection centers were plainly evident in practically all fields. The damage was negligible because the crop was nearly ready for harvest when infection appeared. The rust was not seen elsewhere in the state. (W. A. Archer)

Virginia: Rather severe in counties in southwestern Virginia. Barberry is plentiful in this section of the state. (S. A. Wingard)

North Carolina: Occurrence in state confined to mountains. (Lehman & Fant)

Ohio: General in prevalence in state this year but was severe locally in only a comparatively few places. It is my idea that damage to wheat due to black stem rust in Ohio for 1928 did not exceed one-fourth of one per cent of the crop. Most prevalent this year in parts of Mercer, Auglaize, Preble, Logan, and Lucas Counties respectively. (J. W. Baringer)

Indiana: Very light on all grains and it came in very late. I did not personally inspect a field where I thought the rust had caused appreciable damage. No shriveling was noted in any field. I would not estimate the prevalence or severity at more than a trace. (W. E. Leer)

Iowa: In general there was less stem rust on both winter and spring wheat than last year. In one or two localities in northern Iowa there were fields with 5 to 10 per cent infection but such cases were exceptional. On the average there was only a trace of stem rust for the state as a whole. The loss was nothing. This situation was undoubtedly due in part to the exceptionally dry weather from the early part of May up to the middle of June. By the time humidity was favorable for infection, it was too late for any damage to be done. (R. H. Porter)

Missouri: Up to the present time it is doubtful that this disease is causing much loss in yield in this state as injury is never pronounced. (I. T. Scott).

South Dakota: The amount of loss due to this disease in this state when compared with that of 1927 is very much less. Only in a few isolated spots over the state were heavy infections found. (H. A. Elcock)

Kansas: Very little stem rust occurred in state in 1928. A light infection developed in the northwestern part after June 25. This was too late to do much damage. (C. O. Johnston)

Montana: Losses from black stem rust in state this year have been very light. A number of local spreads of minor severity were recorded, but in only a few cases did these extend over an area of any size. The little damage occurring from this source was on late maturing

Wheat - Stem Rust

Marquis of Supreme wheat. Supreme wheat showed a more severe infection of stem rust than did Marquis, in every case where a comparison was possible. (W. L. Popham)

California: While rust has been found as usual in nearly every area there will be no epidemic of stem rust anywhere in the state this year. (W. W. Mackie)

Recent literature

1. Bailey, D. L., and F. J. Greaney. Sulfur dusting for the control of leaf and stem rust in Manitoba: Field trials with horse-drawn and aeroplane dusters. (Abstract) *Phytopath.* 18: 480. May 1928.
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5. Hutton, L. D. Barberry eradication reducing stem rust losses in wide area. U. S. Dept. Agr. Yearbook 1927: 114-118. 1928.
6. Newton, M., T. Johnson, and A. M. Brown. Physiologic forms of wheat stem rust in Canada. (Abstract) *Phytopath.* 18: 478. May 1928.
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8. Richardson, J. L. The work of barberry eradication. Northwest. Miller 155: 630-631. Aug. 15, 1928.
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10. Stewart, G. Origin of a segregate resistant to black stem rust in a cross between two susceptible plants. *Amer. Nat.* 62: 183-191. Mar.-Apr. 1928.

Wheat - Leaf Rust

LEAF RUST, PUCCINIA TRITICINA ERIKS.

This disease was less prevalent than is often the case. More than the average amount was reported from the New York, Pennsylvania, Delaware section, and from Michigan. In the other states that reported, however, it occurred in average, or less than the average, amounts. Concerning the general situation E. B. Mains reported as follows:

"In general the leaf rust of wheat was late in starting and slow in development. Consequently, as in the south-eastern states and from central Indiana and Illinois northward, it did not reach a maximum, while in southern Indiana, Illinois, Nebraska, and Kansas heavy infection developed very late. Undoubtedly the severe winterkilling throughout most of the soft winter wheat area resulted in but little overwintering of the rust with consequent reduction in inoculum for initiating infection throughout that territory. Where overwintering was abundant as in Texas and Oklahoma the development reached an earlier maximum."

There follow a few reports from state collaborators:

New York: Wet spring favored urediniospore dissemination. Very few fields which showed none of it. Frequently all the leaves were severely diseased. (J. G. Horsfall)

Pennsylvania: In the southeastern part of the state this rust has been the most destructive for several years. It killed the leaves of the wheat plants and 60 to 95 per cent infections were common. First observed at Millerstown, Perry County, May 18. In the northern and western part of the state the infection is considerably less (R. S. Kirby)

Delaware: Infection late in appearing. Very heavy as grain was maturing but not enough to affect yield. (J. F. Adams)

West Virginia: Until about the first of July the majority of the fields had only a scattered infection but during the short intervening period before ripening of the crop many fields developed a moderate amount. The damage to the grain was undoubtedly negligible in general and only slight in a few isolated cases of severe infection. This has been practically the situation for the past 5 years. (W. A. Archer)

Kentucky: Wet cold season delayed its appearance. (W. D. Valleau)

North Carolina: Rather general this year. Wheat growing has been practically abandoned in at least one of the mountain counties during the past few years on account of leaf rust. (G. W. Fant)

Wheat - Leaf Rust

Ohio: General and is moderate to heavy in severity all over state. (Cereal Courier 20 (17): 211. July 20, 1928)

Indiana: Winter wheat was badly winterkilled. There was very little overwintering of leaf rust and the weather unfavorable for development. (E. B. Mains)

Minnesota: Abundant but became heavy late in season. (Dept. Pl. Path.)

Missouri: Rather widespread in central and northern part of state, but along with crown rust of oats seemed to be rather less severe than usual. (I. T. Scott)

Kansas: Came rather late in season. Western half of state had more and eastern half had less than usual. (C. O. Johnston)

Utah: Possibly more important than indicated. No specific data. (B. L. Richards)

Table 67. Percentage losses from leaf rust of wheat as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss	States reporting	loss	States reporting
5	New York	1	Indiana, Montana,
			California
4.5	Pennsylvania	.5	Maryland, Ohio,
4	Kansas		Minnesota, Texas
3	Virginia, Iowa	trace	Delaware, West Virginia,
			Wisconsin, Missouri,
2.5	North Carolina		North Dakota, South
			Dakota, Colorado,
1.5	Michigan		Arizona, Utah, Wash-
			ington, Oregon

Notes on varietal susceptibility were received from Pennsylvania, Illinois, Minnesota, and Oregon.

Pennsylvania: Susceptible - Leap (38.5)*, Forward (48.1), Pennsylvania 44 (48.2). Very susceptible - Red Rock (76.6).

Illinois: Resistant - Kanred (trace)*, Illinois No. 1 (3), Marquis (1.4), Susceptible - Fultz (10.3), Red Wave (9.5), Turkey (11.4)

*Figures in parentheses indicate (1) In Pennsylvania average percentage of infection. (2) In Illinois average percentage leaf area infected.

Wheat - Leaf Rust

Minnesota: Resistant - semi-Marquis and durum.
Susceptible - Kota.

Oregon: Resistant - Haynes Bluestem.

Recent literature

1. Bailey, D. L., and F. J. Greaney. Dusting with sulfur for the control of leaf and stem rust of wheat in Manitoba. *Scient. Agr.* 8: 409-432. Mar. 1928.
2. Greaney, F. J. Studies on the toxicity and fungicidal efficiency of sulfur dusts in the control of some cereal rusts. *Scient. Agr.* 8: 316-331. 1928.

STRIPE RUST, *PUCCINIA GLUMARUM* (SCHM.) ERIKS. & HENN.

This rust was reported to the Survey only from Utah, Montana, Idaho, Washington, Oregon, and California. In Utah about the usual small amounts occurred with a trace of loss estimated. In Montana, P. A. Young (4) and also J. M. Raeder (3) reported an epiphytotic on winter wheat in the Flathead Valley. Practically every field of Jones Fife in that Valley showed 100 per cent infected plants with from 50 to 90 per cent severity according to the scale for estimating cereal rusts. Turkey wheat in the same Valley showed only traces of infection. Young (4) also reported other occurrences in central and western Montana on Jones Fife, Crail Fife, and Marquis.

In Idaho, Raeder (3) reported on the relative susceptibility of 30 winter wheat varieties. Among those that showed resistance were Mosida, Red Russian, Crimean, Sherman, Hussar, Turkey, Kanred, Blackhull, Redit, and Triplet.

In Washington Dr. Humphrey noted traces, and at Corvallis, Oregon, he noted stripe rust on several varieties in the wheat class nursery, especially on Red Clawson and White Odessa. In California heavy infection was noted in some instances on some Early Indian varieties and hybrids.

Stripe rust has been reported from Alberta, Canada (2) where it was first observed in 1926.

Recent literature

1. Allen, R. F. A cytological study of *Puccinia glumarum* on *Bromus marginatus* and *Triticum vulgare*. *Jour. Agr. Res.* 36: 487-513. 1928.
2. Johnson, T., and M. Newton. The occurrence of yellow stripe rust in western Canada. (Abstract) *Phytopath.* 18: 481. May 1928.
3. Raeder, J. M. *Cereal Courier* 20: 235-236. Aug. 10, 1928.

Wheat - Stripe Rust

4. Young, P. A., and H. E. Morris. Plant Diseases in Montana in 1928. Pl. Dis. Repr. Suppl. 69: 110-175. May 15, 1929.

SCAB, *GIBBERELLA SAUBINETII* (MONT.) SACC.

Scab assumed unusual importance throughout most of its normal range in 1928. Favored by the exceptionally frequent and heavy rains of late May and June, infection occurred rather generally in the Corn Belt States with the result that most of them reported more than the average and in some cases considerable damage. The accompanying map (fig. 10) shows not only the states from which scab was reported in 1928, but also the degree of prevalence as compared with the average year.

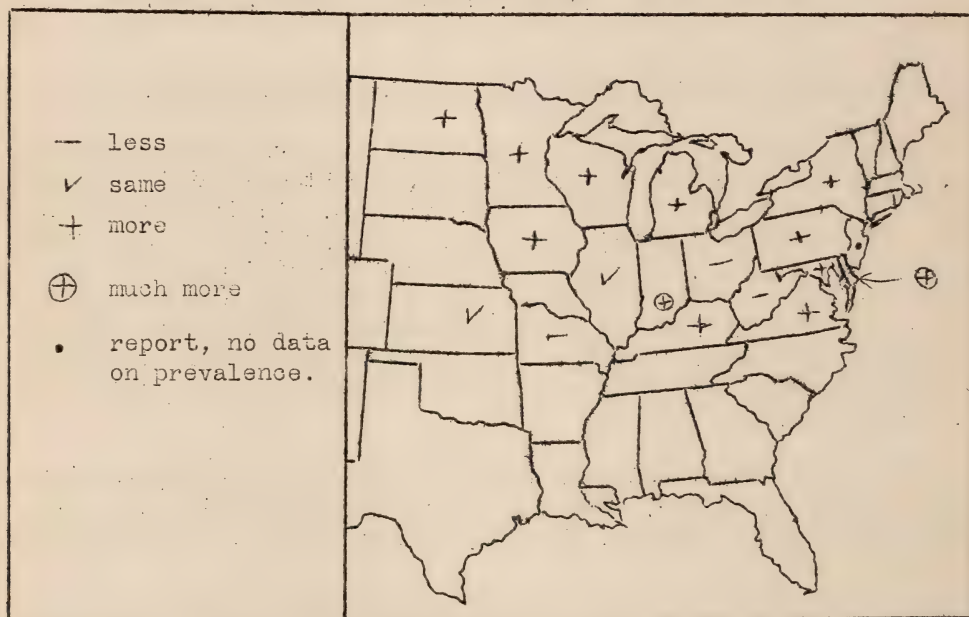


Fig. 10. Prevalence of wheat scab in 1928 as compared with the average year.

New York: Bad this year on the heads. An unusual number of complaints. *Cladosporium* was a common follow-up organism. (J. G. Horsfall)

Pennsylvania: Found in 150 out of the 154 wheat fields surveyed (97.4 per cent). Average percentage affected spikelets in all fields 3.9. Counts showed that 15 per cent infected spikelets equalled about 66 per cent of infected heads. This is the third highest loss reported in Pennsylvania since 1910. (R. S. Kirby)

Indiana: In experimental plots many of the spring and late winter varieties were especially susceptible. In one durum variety, 43.7 per cent kernel infection was noted. (E. B. Mains)

Wheat - Scab

Illinois: In one field of spring wheat, 92 per cent of the heads were infected and on these, 53 per cent of the spikelets were infected - percentage of infected spikelets, in field, 48.7. (G. L. Stout)

Missouri: Not nearly so severe as last year when quite an epidemic occurred. Rainfall and temperature in general seemed fairly satisfactory for infection this year however. (I. T. Scott)

Kansas: Only a few reports, mostly on soft winter wheats in southeastern Kansas. (C. O. Johnston)

Some of the dates when it was first observed on wheat were June 10 in Boone County, Missouri; July 5 in Cumberland County, New Jersey; July 10 at Madison, Wisconsin and St. Paul, Minnesota; July 16 at Fargo, North Dakota.

Table 68. Percentage losses from wheat scab as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss	States reporting	loss	States reporting
15	: Indiana	2.2	: Illinois
6	: Maryland	1.25	: North Dakota
5	: New York	1	: Delaware, Virginia,
3.5	: Pennsylvania		: North Carolina,
2.5	: Missouri		: Michigan, Wisconsin
			: Minnesota, Iowa
		.1	: Ohio

Table 69. Data on susceptibility of wheat to scab as compiled from collaborators' reports, 1928.

Varieties	:	Varieties	:	Varieties
very resistant	:	susceptible	:	very susceptible
Norka (2)	:	Marquis (2)	:	Marquis (3, 4, 5)
Illinois #1 (2)	:	Forward (6)	:	Mindum (3)
Resaca (2)	:	Valley (5)	:	Red Rock (6)
Progress (2)	:	Turkey (5)	:	Leap (6)
Haynes Blue Stem (3)	:	Red Wave (5)	:	Pennsylvania 44 (6)
	:	Kanred (5)	:	Fultz (5)
	:		:	Illinois #1 (5)

Numerals indicate states and collaborators from which data were received, as follows:

- (1) I. T. Scott, Missouri.
- (2) E. B. Mains, Indiana.
- (3) Section of Plant Pathology, Minnesota.
- (4) R. H. Porter, Iowa.
- (5) G. T. Stout, Illinois.
- (6) R. S. Kirby, Pennsylvania.

Recent literature

1. Bennett, F. T. On two species of *Fusarium*, *F. culmorum* (W. G. Sm.) Sacc. and *F. avenaceum* (Fries) Sacc. as parasites of cereals. *Ann. Appl. Biol.* 15: 213-244. May 1928.
2. Dickson, J. G. Wheat scab control effected by cleaning up refuse of crops. *U. S. Dept. Agr. Yearbook* 1927: 702-706. 1928.
3. Dickson, J. G., P. E. Hoppe, J. R. Holbert, and George Janssen. The influence of environment during maturation upon predisposition to seedling blight in wheat and corn strains. (Abstract) *Phytopath.* 19: 79-80. Jan. 1929.
4. Dickson, J. G., E. B. Mains and Helen Johann. Progress report on cereal scab development during the season of 1928. (Abstract) *Phytopath.* 19: 108. Jan. 1929.

ERGOT, *CLAVICEPS PURPUREA* (FR.) TUL.

Slight amounts reported from Indiana, Michigan, North Dakota, and Idaho. More than usual in North Dakota where an estimated loss of 0.3 per cent occurred. Five or six cars containing badly infested Marquis wheat were shipped to Spokane from Bonners Ferry, Idaho.

Recent literature

1. Ponsard, J. L'ergot du blé. *Jour. Agr. Prat.* n.s. 49: 413-414. May 26, 1928.

ANTHRACNOSE, *COLLETOTRICHUM GRAMINICOLUM* (CES.) WILS.

Reported from New York, Pennsylvania, Maryland, and Illinois. In Pennsylvania, where it seemed to be less prevalent than normal, it was found in 38 or 24.7 per cent of the 154 wheat fields surveyed. The average percentage of infected plants was estimated at 0.4 per cent and the loss at 0.2 per cent. In Illinois more than the usual amount occurred, especially in the southern part, but the state loss was only estimated at a trace. The maximum infection in any one field was 100 per cent of infected culms. Field examinations showed the following percentages of infected culms on four varieties: Valley, 24; Tultz, 54.4; Marquis, 63.2; Turkey, 62.8. In the other two states only traces were reported.

GLUME BLOTCH, *SEPTORIA NODORUM* BERK.

More glume blotch than usual was reported from New York, Pennsylvania, Maryland, West Virginia, Wisconsin, North Dakota, and Kansas. It appeared to be most destructive, according to reports, in the Middle Atlantic States, where it assumed major importance among the wheat diseases.

Wheat - Glume Blotch

Percentage reductions in yield in these states were estimated as follows: New York, 1; Pennsylvania, 1.5; Maryland, 10; West Virginia, 5. In all other states reporting, the loss was thought to be not more than a trace. In Maryland this is said to be one of the worst wheat diseases. In West Virginia it became generally severe before harvest and the threshing grain had a shriveled appearance for which glume blotch was probably responsible, since no other diseases were prevalent.

The following are percentages of infected spikelets in four varieties surveyed in Pennsylvania and two in Illinois.

Pennsylvania - Forward, 36 fields, 15.91 per cent.
 Leap, 51 fields, 13.68 per cent.
 Pennsylvania 44, 38 fields, 14.84 per cent.
 Red Rock, 6 fields, 19.6 per cent.

Illinois - Fultz, 3.1 per cent.
 Turkey, 10.4 per cent.

SPECKLED LEAF BLOTCH, SEPTORIA TRITICI DESM.

This disease was reported from several widely scattered states, from the Middle Atlantic States to California. In western New York it was very widespread and destructive to the foliage, causing an estimated reduction in yield, according to Horsfall, of 8 per cent. In Maryland the loss was estimated at 0.5 per cent. In Indiana, where the disease was very abundant, killing the leaves of susceptible varieties early, a loss of 3 per cent was estimated. In California it was especially severe in the northern portions of the state, particularly in early-sown grain. The injury began at germination and continued up until maturity. The loss for that state was estimated by Mackie at 4 per cent. Other percentage losses were: Illinois, 0.6; Kansas, trace; North Dakota, trace.

Field observations in Illinois showed the following percentages of leaf area infected in various varieties: Marquis, 11.3; Illinois No. 1, 13; Red Wave, 33.7; Turkey, 42.3; Valley, 65.8; Fultz, 34; and Kanred, 96.1.

In California, Mackie reports certain hybrids as immune and Defiance and certain selections from it resistant. All the common varieties there are susceptible.

BLACK CHAFF, BACTERIUM TRANSLUCENS UNDULOSUM SMITH, JONES, & REDDY

Black chaff was reported from States in the North-central portion of the country, from Wisconsin and Illinois southward to Kansas and westward to Montana. In Iowa and Kansas and particularly in Minnesota and North Dakota more than the usual amount of this disease occurred. In the two latter important spring wheat states a 1 per cent reduction in yield was estimated and as high as 100 per cent infected plants were noted in individual fields. In the other states the reduction in yield probably did not exceed a trace.

Wheat - Black Chaff

In eastern Illinois it was found only twice, in spring wheat, and in one of these fields 99.3 per cent of the heads showed 57.5 per cent infected spikelets.

Northern Minnesota, western Iowa, eastern Kansas, and eastern Montana are the geographic areas where the disease was reported as being most prevalent.

The variety Hope in Minnesota and the variety Marquis in Illinois were reported as susceptible.

Recent literature

1. Anon. Pathologie végétale. Rapp. Fonct. Inst. Recherches Agron. France 1927: 185-202. 1928.

A disease appearing not to differ from black chaff has existed in France for several years.

2. Godkin, James. Physiological studies of *Bacterium translucens* and *Bacterium translucens* var *undulosum*. (Abstract) Phytopath. 19: 99. Jan. 1929.

POWDERY MILDEW, ERYSIPIHE GRAMINIS DC.

Reported from New York, Pennsylvania, New Jersey, Maryland, West Virginia, Kentucky, Missouri, Kansas, Montana, and Utah. It was said to be very widespread in western New York. In Pennsylvania it occurred in 15, or 10 per cent, of the 153 wheat fields surveyed. The average infection in infested fields was 2 per cent and the estimated reduction in yield for the state 0.25 per cent. In West Virginia it severely attacked plants in the experimental plots at Morgantown, elsewhere about the state it was only rarely seen. The same situation was noted in Montana where experimental plots of Federation and Reliance wheat at Bozeman were rather severely injured. It was not considered of much economic importance in that state. In Kansas considerable of it occurred in lodged bottom fields of the southwestern part of the state. In Utah some damage was evident in the Hunter and Magna districts according to Richards. In 5 out of the 8 fields examined there powdery mildew was severe, occurring on practically every plant and causing marked yellowing which could be seen from a considerable distance.

FOOT ROTS CAUSED BY VARIOUS ORGANISMS

According to Dr. Hurley Fellows in charge of foot rot investigations for the Office of Cereal Crops and Diseases, five different kinds of foot rots are recognized in the United States - take all (*Ophiobolus graminis*), Helminthosporium foot rot (*H. sativum*), two distinct *Fusarium* foot rots, and a foot rot the cause of which is unknown. The situation with regard to them can best be stated by quoting from a summary prepared by him.

Wheat - Foot Rots

Oregon-Washington Section

"The destructive foot rot occurring in Oregon and Washington is of a type different from that found anywhere else in the United States. The cause is not yet known. The occurrence of the disease has been recognized for about 12 years. This foot rot ordinarily does not show its effects until the wheat is headed. In some years, however, there is a killing before heading, but that is the exception. Before maturity, the stems buckle or crinkle at the base, fall over, and lie flat on the ground. At the point of buckling the stem is shrunk and disintegrated. Losses are due chiefly to two things, difficulty in harvesting the wheat, and some decrease in yield of grain.

"In Oregon in 1928 this foot rot occurred abundantly in Wasco and Union Counties and there was a trace in Umatilla County. In Wasco County, where the disease was first recognized this year, the loss was about 15,000 bushels. In Union County, where it has been known for several years, about 22 per cent of the total 30,000 acres of winter wheat were infested. The estimated average annual loss in each of the last four years is about 75,000 bushels.

"In Washington the foot rot occurred in Klickitat and Spokane Counties. Foot rot had not been reported from Klickitat County before 1928, although farmers there claim they have seen some evidence of it as long as 15 years ago. Of 51,000 acres of wheat in Klickitat County about 6 per cent was infested, with a loss of about 8,000 bushels. Spokane County has had foot rot for several years. In 1928 about 4 per cent of the 125,000 acres were infested. The estimated average annual loss in the last four years is about 20,000 bushels yearly."

Montana-Wyoming-Colorado Section

"*Helminthosporium* foot rot is the type found in this section. It attacks all parts of the wheat plant but the most severe losses are caused by attacks on the roots and lower portions of the stem. In 1928 the disease was confined chiefly to fields sown early. In many cases the entire field was destroyed. Death of the plants occurred at all stages of development but mostly shortly after growth had commenced in the spring.

"In Montana in 1928 the Judith Basin was the principal district affected. This includes the Judith Basin County and portions of Fergus and Wheatland Counties. The estimated loss is from 7 to 10 per cent of the entire crop, which would mean about 100,000 bushels. Many individual farmers suffered losses of 80 to 90 per cent of their crop. There were reports of the same sort of trouble in other parts of Montana but it was not possible to survey them.

Wheat - Foot Rots

"Wyoming was not visited because of lack of time, but agronomists in Colorado and Montana reported the presence of the disease in that state.

"In Colorado in 1928 the most severe damage was done in Weld County. This county ordinarily threshes about 1,500,000 bushels of wheat. The estimated loss is about 175,000 bushels. Individual farmers lost 100 per cent of their crop. Many plowed up their fields of winter wheat and sowed spring wheat with the hope of making some crop. The same sort of trouble was reported in localities farther south in Colorado but time did not permit visiting them."

Dakotas-Minnesota District

"Two chief types of foot rot occur in this district, namely *Helminthosporium* foot rot and one of the *Fusarium* foot rots. The general symptoms of the two types of diseases are similar. Wheat plants may be killed at any stage of development, from seedling to maturity. If not killed, they may be so weakened that production is lowered. Losses of this kind are difficult to estimate and also may be confused with the losses caused by stem rust and leaf rust.

"It was not possible to make a survey in this district in 1928. State officials in North Dakota and Minnesota have submitted preliminary estimates of state losses from foot rots in 1928. The estimated loss in Minnesota is 1 per cent, or 250,000 bushels. That in North Dakota is 1.5 per cent, or 2,110,000 bushels, an enormous loss. Another investigator making a different survey in South Dakota reported foot rot in eight counties in northeastern South Dakota. The average estimated loss on 20 farms was 81 per cent. Farmers, agronomists, and pathologists in the states are much concerned with the problem."

Kansas-Oklahoma District

"Two distinct types of foot rot occur, take-all and one *Fusarium* foot rot.

"Take-all occurs in more or less circular spots in the field. These spots may vary in diameter from one foot to many feet. They often become joined forming large diseased areas. Ordinarily all the plants within a spot are killed. There occurs also a scattered infestation, not necessarily in spots, in which the plants are not killed but the yield is distinctly lowered. This condition sometimes is difficult to distinguish. In 1928 take-all was found in 19 counties in central Kansas. The estimated loss is from 15,000 to 20,000 bushels of wheat. In Stafford and Morris Counties it was not uncommon to find fields in which a loss of 50 to 75 per cent of the crop had occurred.

Wheat - Foot Rots

"The *Fusarium* foot rot found in this district occurs in western Kansas (Clark, Ellis, and Thomas Counties), western Oklahoma (Beaver, Custer, and Woodward Counties), and adjacent eastern Colorado (Washington County). It is distinctly a disease of dry land wheat. The plants may show the disease at any time from the beginning of growth in the spring up to harvest time. Plants attacked when young are killed, whereas those attacked later are stunted and the yield reduced. The disease may occur in spots, or individual plants here and there may become diseased. This *Fusarium* foot rot has been but little investigated and its full distribution and destructiveness are not known."

Take-all, *Ophiobolus Graminis* Sacc.

Aside from the reports by Fellows above, collaborators in New York, Kansas, Oregon, and California reported its occurrence. Maryland, Virginia, North Carolina, and Arkansas from all of which the disease has been reported in the past sent in negative reports for 1928. In New York, J. G. Horsfall reported more than last year and estimated a possible loss of about 1 per cent. In Kansas much more than last year was reported with a possible loss of 0.5 per cent for the state. In Oregon it was locally severe but probably only a trace of loss occurred for the state as a whole, according to Barss. In California, W. W. Mackie estimated a 4 per cent loss for the state with an infection as high as 50 per cent in some fields. All varieties of wheat appear to be susceptible to *Ophiobolus*, but Russell (4) has recently noted slight differences in susceptibility although they did not appear to be marked enough to be of any immediate practical importance.

Fellows has recently reported on control by the application of organic matter to infested soil. He also has reported results with placing the inoculum at various depths in the soil. The optimum depth for infection was 2 inches. When the inoculum was placed at 4 inches the plants were not injured.

Recent literature

1. Fellows, Hurley. Some chemical and morphological phenomena attending infection of the wheat plant by *Ophiobolus graminis* Sacc. (Abstract) *Phytopath.* 19: 103-104. Jan. 1929.
2. _____ Studies of certain soil phases of the wheat take-all problem. (Abstract) *Phytopath.* 19: 103 Jan. 1929.
3. Foex, E. Essais de lutte contre la maladie par les pulvérisations à l'acide sulfurique. *Grande Rev. Agr.* 1928: 408-410. Feb. 1928.

Wheat - Foot Rot

4. Russell, R. C. The reaction of wheat varieties to inoculations with *Ophiobolus graminis* Sacc. (Abstract) *Phytopath.* 18: 477. May 1928.

OTHER REPORTS ON HELMINTHOSPORIUM SATIVUM

In addition to the above report collaborators reported *Helminthosporium sativum* as a cause of foot rot from New York, Pennsylvania, Michigan, Wisconsin, Minnesota, North Dakota, South Dakota, Nebraska, Kansas, Colorado, Montana, Washington, and Oregon. In New York one field at Ithaca was severely affected and small losses were also frequently noted throughout western New York. In Pennsylvania, Kirby estimated somewhat more than the average with a loss of perhaps 0.65 per cent. He found the disease in 43 out of 153 fields surveyed. Where wheat followed wheat or other small grains this was one of the most destructive diseases. In Michigan and Wisconsin it was observed locally. In Minnesota, a loss of 1 per cent was estimated with as high as 95 per cent infection observed in some fields. In North Dakota, 1.5 per cent loss was estimated. Kansas reported a trace of loss, while Montana reported 10 per cent loss on winter wheat and 1 per cent in spring wheat. Since the latter predominated the state loss for all wheat was placed at 2.7 per cent. In Colorado, where much more than the usual amount occurred, LeClerc estimated the loss at about 25 per cent and stated that it was limited to late planted dry-land wheat. Fields were seen that produced less than four bushels per acre because of this foot rot. In Oregon, Barss reported the total loss for the state slight (trace) but locally some few fields lost as high as 75 per cent of the value of the crop.

NEMATODE, TYLENCHUS TRITICI (STEIN.) BAST.

According to Jehle and Oldenburg, wheat nematode occurred in Maryland in greater amounts than usual, it being actually observed in 4 fields this year. Reports of occurrence in other fields in the vicinity of Gaithersburg were also received. In Virginia a slight infestation was reported from one field. From West Virginia, where in previous years traces have been found in some of the eastern counties, none was observed in 1928.

Recent literature

1. Samuel, G. Two 'stunting' diseases of wheat and oats. *Jour. Dept. Agr. South Australia* 32: 40-43. 1928.
2. Thorne, G. *Heterodera punctata* n. sp., a nematode parasitic on wheat roots from Saskatchewan. *Scient. Agr.* 8: 707-710. July 1928.

Wheat - Other Diseases

OTHER DISEASES

Alternaria sp., moldy head, Montana.

Bacterium atrofaciens McCul. (Phytophthora atrofaciens (McCul.) Comm. S.A.B.), basal glume rot. A few heads showing symptoms of this disease were collected by Kirby in York County, Pennsylvania, June 28, and in Cumberland County, June 29. In southern Illinois a considerable number of collections were made. Field observations showed the following percentages of spikelets infected in five varieties: Marquis, trace; Red Wave, trace; Fultz, 0.1; Turkey, 0.1; Kanred, 0.3. Collections were also made in Montana.

Fusarium sp., pink root. One per cent reduction in yield in California, according to Mackie. All varieties susceptible.

Fusicladium alopecuri E. & E., moldy head, Montana.

Helminthosporium sp., moldy head, Montana.

Marasmius tritici Young. Found infecting a few plants in fields in three different Illinois counties. First collected June 3 at Vergennes. The varieties affected were Turkey and Fultz.

Mycosphaerella tulasnei Jacz. The conidial stage of this fungus, Cladosporium herbarum (Pers.) Ek., occurred commonly in New York on wheat heads following scab or glume blotch. Several instances of considerable amounts but of slight damage were observed in the eastern panhandle of West Virginia.

What is probably this same fungus but reported under the name of Hormodendron cladosporioides Sacc., is an important factor in production in certain of the coastal areas of California, affecting all varieties according to Mackie. Some fields showed 100 per cent infected heads.

Typhula graminum Karst., reported from Gallatin County, Montana, in one field of winter wheat.

Black point, associated with Helminthosporium spp. Nebraska.

Crinkle joint, non-par. Small amounts found in Montana.

Leaf spot, non-par. Several non-parasitic or undetermined leaf lesions were reported from Montana by P. A. Young (7).

Stripe, undet. Pennsylvania and Illinois causing traces of loss in each state, prevalent in about the same amounts as usual.

Recent literature

1. Bennett, F. T. On Cladosporium herbarum: the question of its parasitism, and its relation to "thinning out" and "deaf ears" in wheat. Ann. Appl. Biol. 15: 191-212. May 1928.

Wheat - Other Diseases

2. Lacoudre, W. Note sur le piétin du blé. Jour. Agr. Prat. n.s. 49: 414-415. May 26, 1928.
3. Samuel, Geoffrey. Two stunting diseases of wheat and oats. Jour. Dept. Agr. South Australia 32: 40-43. Aug. 1928.
4. Subramaniam, L. S. Root rot and sclerotial diseases of wheat. Bull. Agr. Res. Inst. Pusa 177, 7 p. 1928.
5. Thorne, Gerald. *Heterodera punctata* n. sp. A nematode parasitic on wheat roots from Saskatchewan. Scient. Agr. 8: 707-711. July 1928.
6. Webb, R. W. Further studies on the soil relationships of the mosaic disease of winter wheat. Jour. Agr. Res. 36: 53-75. Jan. 1, 1928.

R Y E

STEM RUST, PUCCINIA GRAMINIS PERS.

Stem rust on rye occurred only in very slight amounts and for the country as a whole, caused practically no damage. For the most part, the crop matured early enough to escape and the losses that were reported were in fields with barberry bushes in the vicinity. A loss of 0.1 per cent was estimated by the collaborators from Ohio; traces, or less than 0.1 per cent of loss were estimated for Massachusetts, New Jersey, Maryland, Indiana, Wisconsin, North Dakota, Kansas, Texas, and California. It was estimated not to have caused any loss in Pennsylvania, Virginia, West Virginia, Illinois, Michigan, Minnesota, Iowa, South Dakota, Nebraska, Montana, Colorado, Wyoming, and Arizona. The states of New York, Pennsylvania, West Virginia, Mississippi, Louisiana, Arkansas, Illinois, Colorado, Arizona, and Washington reported that the rust had not been observed. In Illinois no record of its observation since 1924 is available in the National History Survey Files according to G. L. Stout.

LEAF RUST, PUCCINIA DISPERSA ERIKS.

Collaborators in Pennsylvania, Delaware, and Ohio, reported more of this leaf rust than the average. Those in West Virginia, Illinois, Michigan, Wisconsin, Minnesota, Kansas, and Colorado reported the usual amounts while those in Indiana reported less. Reports of non-observation were received from Massachusetts, New York, Maryland, Mississippi, Louisiana, Texas, Iowa, North Dakota, and Arizona.

In general, leaf rust damage was very slight and, as a factor in reduction of the rye crop, was not of importance. Losses were estimated as in Table 70.

Table 70. Percentage loss from leaf rust of rye as estimated by collaborators, 1928.

Percent-:	States reporting	Percent-:	States reporting
age loss:		age loss:	
5	: Florida	Trace	: West Virginia, Indiana,
1	: Pennsylvania, Virginia:		: Michigan, Wisconsin,
	: Ohio		: Minnesota, Kansas, Mississippi,
			: Colorado, Illinois.
		0	: Iowa, North Dakota, South
			: Dakota, Montana, Arizona,
			: California.

*SAUBINETII*SCAB, *GIBBERELLA SAUBINETII* (MONT.) SACC.

More scab than usual occurred on rye particularly in Delaware, Indiana, Michigan, Wisconsin, and Minnesota. Estimates of 5 per cent loss were received from Indiana, 1 per cent from Michigan, 0.2 per cent from Wisconsin, and trace from Pennsylvania, Maryland, and Minnesota.

ERGOT, CLAVICEPS PURPUREA (FR.) TUL.

Ergot was reported as occurring widely with the crop, and in general it seemed to be considerably more prevalent than usual. Several collaborators mentioned the fact that the weather conditions at flowering time were favorable for infection. The Bureau of Agricultural Economics, United States Department of Agriculture, issued a statement October 19 that in the grading of rye, the outstanding problem was the abnormal amount of ergot. Of the 682 cars of rye received for September (at Chicago), 35 per cent were graded ergoty. This situation resulted in a heavy discount for rye bearing the ergoty notation.

Among the states reporting more ergot than usual were some of those which are most important in rye production, North Dakota, Minnesota, Wisconsin, Michigan, and Pennsylvania. In North Dakota, which produced over twelve million bushels in 1928 or more than one-third of the total United States crop, much more than usual was generally reported and the loss in yield was estimated at 2 per cent which would be equivalent to about 259,000 bushels. Other losses were estimated by collaborators as follows: 2.5 per cent, Wisconsin; 1 per cent Indiana, Michigan, Minnesota; 0.5 per cent, Ohio; trace Massachusetts, Pennsylvania, Maryland, Oregon. In Pennsylvania, the infection was said to be the heaviest seen there for five years.

In connection with the losses from this disease, a significant statement is made by R. E. Vaughan of Wisconsin who says that the low yield in 1928 may be more due to ergot than is generally estimated on account of possible sterility brought about by the causal fungus.

SMUT, UROCYSTIS OCCULTA (WALLR.) RABH.

Only five states, Delaware, West Virginia, Wisconsin, Minnesota, and Iowa, reported this disease. Fifteen other states reported its absence or non-observation. It was not a factor of any economic importance.

ANTHRACNOSE, COLLETOTRICHUM GRAMINICOLUM (CES.) WILS.

Anthracnose was reported from Pennsylvania and Virginia westward to Wisconsin. In general, only traces reduction in yield were reported but in Pennsylvania, which produced about 1,500,000 bushels in 1928, the loss was estimated at 2 per cent. The average percentage of infected plants in the fields surveyed there was 9.1 per cent.

OTHER DISEASES

Erysiphe graminis DC., powdery mildew. New Jersey, Pennsylvania, West Virginia. In Pennsylvania, R. S. Kirby noted an average of 10 per cent infected plants in the fields surveyed and estimated a loss of about 0.5 per cent. In West Virginia, it was noted severely attacking the lower leaves in experimental plots at Morgantown but elsewhere about the state it was only rarely observed.

Rhizoctonia sp. Noted February 29, Ocean Springs, Mississippi.

Septoria secalis Prill. & Del., leaf blotch. Trace in Iowa.

Crinkle-joint, non-par. Montana, trace.

Recent literature

1. Brooks, F. T. Observations on Rhynchosporium secalis (Oud.) Davis, leaf blotch of barley and rye. New Phytol. 27: 215-219. Nov. 1928.
2. Pfeil und Klein-Ellguth, H. A. Graf v. Beitrag zur Kenntnis der Roggenfusariose. (Contributions to the knowledge of the rye fusariosis.) Centralbl. Bakt., Ab. II, 73: 347-373, 1928. (Abstract in Rev. Appl. Myc. 7: 505. Aug. 1928.)

B A R L E Y

COVERED SMUT, USTILAGO HORDEI (PERS.) KELL. & SW.

This smut was reported from several states with loss estimates as shown in the following table:

Barley - Covered Smut

Table 71. Losses from covered smut of barley as estimated by collaborators, 1928.

Percent-: age loss:	States reporting	::Percent-: age loss:	States reporting
:	:	::	:
10	: Maryland	::	1 : Texas, Indiana, Iowa,
5	: California	::	: North Dakota, Kansas,
3	: Virginia, North Carolina,	::	: Utah.
	: Montana	::	0.75 : Minnesota
2	: Massachusetts, Oregon	::	0.6 : Wisconsin
1.5	: Pennsylvania, New Mexico.	::	0.5 : Ohio
:	:	::	trace : New York, West Virginia,
:	:	::	: Colorado, Washington.

Maximum percentages of infection were reported as follows: 40, California; 30, West Virginia (on late crop planted for forage); 25, Virginia; 23, Washington; 10, Minnesota; 6, Pennsylvania.

Leukel (2) has recently reported successful control with certain liquid and dust seed treatments.

Recent literature:

1. Hewlett, C. H. Hot-water treatment of seed barley. New Zealand Jour. Agr. 36 185-186. 1928.
2. Leukel, R. W. Experiments with liquid and dust seed disinfectants for controlling covered smut of barley and stinking smut of wheat, 1926-1928. (Abst.) Phytopath. 19: 31. Jan. 1929.

LOOSE SMUT, USTILAGO NUDA (JENS.) KELL. & SW.

This smut appeared to be prevalent in about the normal amount and for the country as a whole probably caused about the same losses as did the covered smut. It was reported from the states listed in the following table.

Table 72. Losses from loose smut of barley as estimated by collaborators, 1928.

Percent-: age loss:	States reporting	::Percent-: age loss:	States reporting
:	:	::	:
8	: North Carolina	::	0.6 : Wisconsin
3.5	: Pennsylvania	::	0.5 : Ohio, Arizona, California.
3	: Massachusetts	::	Trace : Delaware, Maryland,
2	: New York	::	: Mississippi, Michigan,
1	: Virginia, Texas, Minnesota:	::	: Iowa, Oregon.
	: North Dakota, Kansas,	::	:
	: Montana, Colorado.	::	:

Barley - Loose smut

Maximum percentages of infection amounting to 25 per cent were noted in Pennsylvania, 12 per cent in California, and 10 per cent in Minnesota.

In North Carolina loose smut appears to be of considerable economic importance. According to G. W. Fant, it was observed in all fields examined and in many instances was seriously reducing yields. One field in Davidson County which was sown with formaldehyde-treated seed produced at least 20 per cent loose smut.

The hot water treatment was employed for what appears to be the first time in North Carolina on some half-dozen farms in the fall of 1928. Growers of certified seed in New York State also used the hot water treatment and this method of control was followed more or less in West Virginia.

The variety Alpha was mentioned as especially susceptible in New York and Pennsylvania.

STEM RUST, *PUCCINIA GRAMINIS* PERS.

Stem rust caused only slight damage to barley in 1928. It was a year when the losses from this disease approached the minimum. Late planted fields and those near barberries seemed to be the only ones that suffered much injury. The only states reporting losses of more than a trace were Ohio, Iowa, South Dakota, and Arizona, in all of which about 0.5 per cent loss was thought to have been sustained. The states reporting a trace of loss were Massachusetts, Pennsylvania, Maryland, Indiana, Illinois, Michigan, Wisconsin, North Dakota, Nebraska, Colorado, Wyoming, Utah, Oregon, and California. States reporting no loss were Virginia, West Virginia, Minnesota, Kansas, and Montana.

LEAF RUST, *PUCCINIA ANOMALA* ROSTR.

This rust was reported from New York, Pennsylvania, Maryland, Tennessee, Ohio, Illinois, Indiana, Michigan, Wisconsin, Minnesota, Iowa, South Dakota, Kansas, Colorado, Washington, Oregon, and California. It was said not to have been observed by collaborators in Massachusetts, West Virginia, Mississippi, Louisiana, North Dakota, and Arizona. Kansas was the only state reporting somewhat more than average amounts. The others reported the same or less than the average. In only one state did the loss exceed a trace, and that was California where Mackie estimated the reduction in yield at 0.5 per cent.

Recent literature

1. Brown, A. M. and M. Newton. The dwarf leaf rust of barley in Western Canada (Abstract). *Phytopath.* 18: 481. May 1928.
Sci. Agr. 8: 463. Mar. 1928.

SCAB, GIBBERELLA SAUBINETII (MONT.) SACC.

Reports of barley scab received by the Survey indicate clearly that the disease was more prevalent and destructive than in any other year since records have been kept. In 1919 and again in 1924 it was considerably more common than usual, but the circumstances of 1928, whereby an unusually large acreage of barley was planted on corn or wheat land in the Corn Belt, and when weather conditions were especially favorable for scab development, resulted in what was probably the greatest epiphytotic of this disease yet experienced.

The situation was well stated by J. G. Dickson, Madison, Wisconsin, October 1:

"Practically all of the barley grown in Indiana and Illinois was very heavily scabbed, frequently ranging as high as 50 to 60 per cent, and I visited some fields especially of smooth-awned barley or beardless barley where there was 100 per cent infection with approximately 90 per cent damage. Southeastern Iowa and southwestern Wisconsin were damaged to the extent of 15 to 20 per cent and in a few fields as high as 30 per cent scab was counted. This is especially serious inasmuch as the barley acreage in Indiana and Illinois was more than doubled during the past season. The increase was due to the emphasis placed upon barley culture in connection with the corn borer and to the fact that a large percentage of the winter-killed winter wheat acreage was replanted to oats or barley. Scab, therefore, has done a great deal of damage to spring wheat, barley, and in certain sections, oats."

Reports by individual states follow:

Pennsylvania: Same as usual, trace loss, 6 per cent maximum infection. (R. S. Kirby).

New Jersey: Occurred locally. (Dept. Plant Path.)

Delaware: Much more. Observed in general plantings. (J. F. Adams).

Maryland: Same as usual, only trace loss. (R. A. Jehle).

Ohio: Very prevalent, heavy losses due to shriveled grain (R. C. Thomas, Sept. 25).

More abundant than usual; Franklin, Putnam, Wayne Counties. (W. G. Stover, Aug. 15).

Indiana: Showing to a considerable extent on a number of varieties in the leaf rust nursery. (E. B. Mains, July 10).

Very severe. Counts in experimental plots showed over 70 per cent kernels badly infected. (E. B. Mains, Sept. 25).

Very prevalent in this state this year especially on barley. Several varieties in our experimental plots showed over 70 per cent of kernels infected and some of the hooded varieties will probably show a higher percentage. While this probably represents extreme severity, the reports and samples which have been

Barley - Scab

coming to the state since harvesting indicate that heavy infection occurred commonly throughout the state. (E. B. Mains, Sept. 28).

Much more than average. Estimated loss for state 20 per cent. Maximum infection in one field 75.1 per cent. Very wet during blossoming. All hooded varieties susceptible. (E. B. Mains).

Illinois: Severe throughout Illinois. (Benj. Koehler, Sept. 26).

Michigan: More than usual, general, trace loss. (W. F. Reddy).

Wisconsin: Developing extensively on barley, up to 50 per cent of heads affected in a few fields in southern Wisconsin seeded on poorly prepared corn stubble. (R. E. Vaughan, Aug. 1).

More, trace loss. Scab reported from elevators seems to have originated in other states. (R. E. Vaughan).

Minnesota: Worst epidemic on barley recorded in Minnesota. Many fields with 5 to 20 per cent of heads affected. (Sect. Plant Path., Aug. 15).

About 10 per cent heads, southern Minnesota, affected with scab. (E. C. Stakman, Sept. 25).

Much more than average. 1 per cent loss for state general but more especially in southern half of state. Peatland very resistant, Manchuria 184 resistant, and Velvet and Glabron susceptible. (Sect. Plant Path.).

Iowa: Quite common on Velvet and other barleys. About 1.5 per cent damage for state. (R. H. Porter, July 1).

More prevalent than for a number of years. Barley and wheat in western Iowa are suffering most, but oats show a trace to 2 per cent. (R. H. Porter, July 10).

Unusually severe this year and its prevalence on Velvet may have been due more to favorable environment rather than any unusual susceptibility of that variety. Estimated loss for state, 3 per cent. (Four per cent reduction in yield and 4 per cent loss in grade.) Maximum in any one field, 50 per cent. Barley production has been on the increase during the last 3 years due largely to poor corn crops and to the introduction of smooth bearded varieties of barley, such as Velvet. (R. H. Porter).

Collaborators in the states of Massachusetts, New York, West Virginia, Mississippi, Louisiana, and Arkansas reported the non-observation or non-occurrence of scab on barley.

Figure 11. States from which barley scab has been reported to the Survey in the past. States marked with a solid dot (.) are those that reported it in 1928 as well as in other years.



Recent literature:

1. Christensen, J. J., H. A. Rodenhiser, and Chih Tu. Susceptibility of barley varieties to Fusarial head blight in Minnesota. (Abst. Phytopath. 19: 80. Jan. 1929.
2. Dickson, James G., E. B. Mains, and Helen Johann. Progress report on cereal scab development during the season of 1928. (Abst.) Phytopath. 19: 108. Jan. 1929.

STRIPE, HELMINTHOSPORIUM GRAMINEUM RABH.

Considerably more than the average amount of stripe was reported from several states, most of which are important in barley production, as follows: Pennsylvania, Virginia, Ohio, Michigan, Wisconsin, Iowa, Kansas, and Colorado. In Pennsylvania, it was noted in 80 per cent of the fields examined and in Virginia it was found in practically every field. In Utah it was said to be by far the most destructive disease of barley.

Table 73. Losses from barley stripe as estimated by collaborators, 1928.

Percent-: age loss:	States reporting	::Percent-: age loss:	States reporting
5	: Utah	:: 1	: Virginia, Minnesota,
4	: Iowa	::	: Kansas.
3	: Wisconsin, California	:: 0.5	: Michigan, North Dakota.
2	: Pennsylvania, Montana	:: 0.1	: Texas, Ohio.
:	:	:: Trace	: New York, Maryland, West
:	:	::	: Virginia, Indiana, Colorado,
:	:	::	: Arizona, Washington, Oregon.

Barley - Stripe

Maximum percentages found in any one field as reported by the states were: Iowa 40, Utah 29, Illinois 20, Minnesota, Colorado and California 15, Pennsylvania and Virginia 10, West Virginia, North Dakota, and Arizona 5.

In addition to the reports on control by seed treatment mentioned in the references below, Vaughan in Wisconsin reported that the new organic mercury treatments showed encouraging promise of control and R. H. Porter in Iowa reported that certain dust fungicides greatly reduced stripe on Oderbrucker and Manchuria varieties but had little effect on Velvet.

Varietal susceptibility was reported on as follows:

- Minnesota: Resistant - Velvet
Susceptible - Svansota and Minsturdi
- Iowa: Susceptible - Velvet and Minsturdi
- Kansas: Resistant - Vaughn and Flynn
Susceptible - Stavropol and Mariout

Recent literature

1. Howitt, J. E., and R. E. Stone. Results of experiments on the control of barley stripe. (Abstract). Sci. Agr. 8: 459-460. March 1928. (Abstract) Phytopath. 18: 477. May 1928.
2. Leukel, R. W., J. G. Dickson, and A. G. Johnson. Experiments on stripe disease of barley and its control. (Abstract) Phytopath. 19: 81. Jan. 1929.
3. Nisikado, Y., and C. Miyake. Studies on the uspulun treatment of cereal seeds against the Helminthosporioses. Agric. Studies 11: 36-64, 1927. (Japanese). (Abs. in Jap. Jour. Bot., 1: 19-30. 1928.
4. Rodenhiser, H. A. Experiments on the control of barley stripe. Phytopath. 18: 295-300. Mar. 1928.
5. Tisdale, W. H., and W. N. Cannon. Ethyl mercury chloride as a seed grain disinfectant. (Abstract) Phytopath. 19: 81. Jan. 1929.

SPOT BLOTCH, HELMINTHOSPORIUM SATIVUM P. K. & B.

Reports of spot blotch were received from New York, Pennsylvania, Wisconsin, Iowa, Kansas, Utah, and California. In most cases, it was not of very great importance, although in California, which ranks fourth in barley production, 2 per cent loss was estimated, and in Iowa and Pennsylvania, 1 per cent loss.

NET BLOTCH, PYRENOPHORA TERES (DIED.) DRECHS (HELMINTHOSPORIUM TERES SACC.)

Traces of damage from this fungus were reported to the Survey from Pennsylvania, Wisconsin, Montana, Idaho, and California, and a loss of 2 per cent was estimated from Iowa.

Recent literature

1. Geschele, E. (The response of barleys to the parasitic fungus *Helminthosporium teres* Sacc.) Trudy Prikl. Bot., Gen. i Sel. (Bull. Appl. Bot., Gen. & Plant Breed.) 19(1): 371-384. 1928. (Russian with English summary).

SCALD, RHYNCHOSPORIUM SECALIS (OUD.) DAVIS

Although the occurrence of this disease was reported from Wisconsin, the only states reporting real destruction were Oregon and California. In the former state, there was more than the usual amount, an especially heavy attack being reported from some Oregon fields of winter barley.

In California, particularly in the Sacramento Valley and the northern half of the state, very severe damage occurred, according to Mackie. As usual it continued to be the most destructive cereal disease in California. Less scald was noted in the irrigated fields of the San Joaquin Valley.

Recent literature

1. Caldwell, Ralph M. Preliminary results from cross inoculation and culture studies upon the fungus *Rhynchosporium secalis* (Oud.) Davis, causing scald of cereals and other grasses. (Abstract) Phytopath. 104. Jan. 1929.
2. Brooks, F. T. Observations on *Rhynchosporium secalis* (Oud.) Davis, leaf blotch of barley and rye. New Phytol. 27: 215-219. 1928.

POWDERY MILDEW, ERYSIPIHE GRAMINIS DC.

Traces of powdery mildew were widely reported in 1928 but only a few states reported it of any particular importance. In California, a loss of 4 per cent of the crop was estimated and in western Oregon it damaged some barley fields considerably. From the eastern part of the country reports of 0.5 per cent loss in Massachusetts and Pennsylvania were received. Other states mentioned only a trace of damage.

The variety Sacramento is immune in California according to Mackie while the California Mariout and other common varieties are very susceptible.

Recent literature

1. Mackie, J. R. Localization of resistance to powdery mildew in the barley plant. Phytopath. 18: 901-910. Nov. 1928.

OTHER DISEASES

Bacterium translucens Jones, Johnson, and Reddy, bacterial blight. Texas.

Claviceps purpurea (Fr.) Tul., ergot, was reported in barley from Massachusetts, Ohio, Indiana, Michigan, Wisconsin, Minnesota, Iowa, and North Dakota. In none of these states was it of more than occasional occurrence.

Colletotrichum graminicolum (Ces.) Wils., anthracnose. Traces reported from Pennsylvania and Wisconsin.

Helminthosporium californicum Mackie and Paxton, rusty blotch. California, 1 per cent loss, 100 per cent maximum infection observed.

Recent literature

1. Bennett, F. T. On two species of *Fusarium*, *F. culmorum* (W. G. Sm.) Sacc. and *F. avenaceum* (Fries.) Sacc., as parasites of cereals. *Ann Appl. Biol.* 15: 213-244. May, 1928.
2. Mackie, W. W. Inheritance of resistance to rusty blotch in barley. *Journ. Agr. Res.* 36: 965-975. June 1, 1928.

O A T S

LOOSE SMUT, *USTILAGO AVENAE* (PERS.) JENS., AND COVERED SMUT, U. LEVIS (KELL. AND SW.) MAGN.

Of these two smuts, the loose smut seemed to be the more common through the country as a whole, although in Montana and Oregon the covered smut was reported as causing more damage, and in Colorado they were reported as of equal prevalence. For the most part, pathologists do not distinguish between these two smuts in the field, hence they are usually reported together.

According to collaborators' reports, smuts were of about the usual prevalence, but in Wisconsin, Minnesota, and Missouri they were more prevalent than usual and in Iowa and Kansas much more prevalent. In Iowa, R. H. Porter reported the worst epidemic observed for many years. It occurred generally over the state but was more severe in some regions than others. For example, in northeastern Iowa, fields showed as high as 50 per cent infected plants. In Kansas it also assumed epidemic proportions, C. O. Johnston reporting it as more severe than he has ever seen it before. He attributes this to the introduction of a possible, new, southern, physiologic form which is rapidly increasing in the state. One reason for believing this is that the variety Kanota, which is resistant to the common Kansas form, shows as much as 40 per cent smut in many fields this year. If this theory of increased prevalence is true in Kansas, it might also provide a reason for the increased infection in the other western states mentioned.

Oats - Loose smut

Table 74. Losses from loose and covered smuts of oats as reported by collaborators, 1928.

Percent-: age loss:	States reporting	::Percent-: age loss:	States reporting
10	: Massachusetts, West Vir-	:: 4	: Virginia, Colorado.
	: ginia, Wisconsin.	:: 3	: Florida, Mississippi,
8	: Pennsylvania, North	::	: Indiana
	: Carolina.	:: 2	: New York, Texas, Arkansas,
7	: Iowa, Utah.	::	: North Dakota, Arizona.
6	: Missouri, Montana.	:: 1	: New Jersey, Louisiana,
5	: Maryland, Georgia, Ohio,	::	: Michigan, Washington.
	: Minnesota, Kansas, Oregon.:	0.5	: Delaware

Maximum percentages were reported from the states as follows:

60 Minnesota, Kansas, and Colorado; 50 Wisconsin, Iowa; 43 Pennsylvania; 36 Montana; 30 New York, West Virginia, North Carolina.

In Pennsylvania, R. S. Kirby made counts in 80 oat fields and found smut in 95 per cent of them. The 5 per cent of fields without smut were all planted with seed treated by the dry formaldehyde method, which is being recommended in Pennsylvania because it gives fine control and farmers are satisfied with it. The average percentage of smut found in all fields was 8.3.

The following varieties were reported very susceptible: Liberty, Hulless, and Anthony in Minnesota, and Iogold, Early Champion, and Swedish Select in Iowa. In the latter state, Iowa 103 and Kherson were said to be susceptible and Iowa 105 resistant.

Why farmers should tolerate these high losses from a disease which is so easily controlled by a variety of dust and liquid treatments still remains somewhat of a mystery.

Recent literature:

1. Gage, E. R. Studies on the life history of *Ustilago avenae* (Pers.) Jensen and of *Ustilago levis* (Kell. & Swing.) Magn. Cornell Agr. Exper. Sta. Mem. 109 33 pp. 1927.
2. Hayes, H. K., F. Griffiee, F. J. Stevens, and A. P. Lunden. Correlated studies in oats of the inheritance of reaction to stem rust and smuts and of other differential characters. Jour. Agr. Res. 36: 437-457 1928.
3. Kharbush, S. S. Contribution a l'etude des phenomenes sexuels chez les Ustilaginees. Ann. Sci. Nat. Bot., Ser. X, 9: 285-297. 1927.
4. Maschmeier, W. Eine neue Trockenbeize zur Bekämpfung des Haferflugbrandes. Nachricht. Schädlingsbekämpf. 3 (1): 1-4, 1928.

Oats - Loose smut

5. Moldenhauer, J. Untersuchungen über die Empfänglichkeit der Wildund Kulturhaferformen für *Ustilago avenae* mit besonderer Berücksichtigung des Infektionsvorganges. KÜhn-Arch., 15: 349-409, 1927.
6. Pierstorff, A. L., and J. D. Sayre. Further results of oat-smut control in Ohio. (Abst.) Phytopath. 19: 102-103. Jan. 1929.
7. Reed, G. M. The inheritance of resistance of oat hybrids to loose and covered smut. Ann. New York Acad. Sci. 30: 129-176, 1928.
8. Sampson, K. The biology of oat smuts I. Ann. Appl. Biol. 15: 586-612. Nov. 1928.
9. Sayre, J. D. and R. C. Thomas. Formaldehyde and iodine dusts for the control of oat smut. Ohio Agr. Exp. Sta. Bi-month. Bull. 13: 19-21. Jan./Feb. 1928.
10. Tapke, V. F. Formaldehyde seed treatment for oat smuts. U. S. Dept. Agr. Misc. Pub. 21: 4 pp. 1928.

STEM RUST, PUCCINIA GRAMINIS PERS.

On oats, stem rust was less prevalent than last year and the average year. Of the 14 states reporting on prevalence, only one, New York, mentioned the occurrence of more than last year and none mentioned more than the average. For the most part, it was scattered in its distribution. Several states including Ohio and Iowa mentioned its occurrence in severe amounts only near barberries.

In Wisconsin and Minnesota, however, it was said to be generally distributed. In Kansas it appeared too late to do any damage. California was the only state reporting the disease as of much economic importance. In that state, according to W. W. Mackie, it limits the production of oats in certain areas. The loss last year was estimated at 5 per cent of the crop in that state and fields were seen of 100 per cent infection. Mackie mentions the Richland 320a and some of its hybrids as immune from stem rust with all other varieties especially susceptible.

Losses are given in Table 75.

Table 75. Percentage loss from stem rust of oats as estimated by collaborators, 1928.

5	: California.
1	: Texas, Massachusetts.
0.75	: North Dakota.
0.5	: Pennsylvania, Ohio, Wisconsin.
Trace	: Maryland, Virginia, Georgia, Indiana, Illinois, Michigan, : Missouri, South Dakota, Nebraska, Kansas, Mississippi, : Wyoming, Colorado, Arizona, Washington, Oregon.

Recent literature:

1. Gordon, W. L. Physiologic forms of *Puccinia graminis avenae* Erikss. and Henn., in Canada. (Abst.) *Phytopath.* 18: 479. May 1928.
2. Greaney, F. J. Studies on the toxicity and fungicidal efficiency of sulphur dusts in the control of some cereal rusts. *Scient. Agr.*, 8: 316-331, 1928.
3. Hayes, H. K., F. Griffie, F. J. Stevenson, and A. P. Lunden. Correlated studies in oats of the inheritance of reaction to stem rust and smuts and of other differential characters. *Jour. Agr. Res.*, 36:437-437. 1928.

CROWN RUST, *PUCCINIA CORONATA* CDA.

Crown rust was considerably less prevalent than in 1927 and somewhat less prevalent than normal according to reports of collaborators in 1928. In general, it developed too late in the season to do much damage in the more important oat states and late planted oats suffered the most. As usual, some of the highest losses were reported from the southern states where winter oats are grown.

Table 76. Percentage losses from crown rust of oats as estimated by collaborators, 1928.

Percent- age loss:	States	Percent- age loss:	States
30	: Florida	0.5	: Massachusetts, Georgia,
10	: Louisiana		: Ohio, Texas
1	: Virginia, Mississippi,	0.1	: Oregon
	: Indiana, Wisconsin, North	Trace	: Pennsylvania, Delaware,
	: Dakota, Kansas.		: Maryland, Illinois,
			: Michigan, Missouri,
			: Arkansas, Washington,
			: California

The relation to buckthorn was especially mentioned in Wisconsin where several cases of spread from buckthorn to oats were noticed in the southern part of the state.

Considerable variation in the susceptibility of oat varieties was noted in Florida and Arkansas. In the latter state, according to H. R. Rosen, the following percentages of loss in yield were calculated: Arkansas Selection, 10 per cent; Iowa 105, 10 per cent; Iogren, 3 per cent; Oklahoma Red Rust Proof 5 per cent, Fulghum, 10 per cent. Under Louisiana conditions, E. C. Tims reported that the Texas Red Rust Proof is not resistant.

SCAB, *GIBBERELLA SAUBINETII* (MONT.) SACC.

On oats, this disease was reported to the Survey from New Jersey, Delaware, Maryland, Pennsylvania, Ohio, Indiana, Wisconsin, Minnesota, and Iowa. As in the case of the other cereals, it was more prevalent than normal. Losses were reported as follows: Pennsylvania, trace; Ohio, 0.1 per cent; Indiana, 3 per cent; Wisconsin, trace; Iowa, 0.5 per cent.

Recent literature:

1. Bennett, F. T. On two species of *Fusarium*, *F. culmorum* (W. G. Sm.) Sacc. and *F. avenaceum* (Fries.) Sacc., as parasites of cereals. *Ann. Appl. Biol.* 15: 213-244. May, 1928.
2. Simmonds, P. M. A seedling blight disease of oats caused by *Fusarium culmorum*. (Abs.) *Phytopath.* 18: 480. May 1928. (Abs.) *Sci. Agr.* 8: 463. March 1928.

OTHER DISEASES

Bacterium coronafaciens Elliott, halo blight. Reported from Pennsylvania, Indiana, Wisconsin, Kansas, and Montana in about the same amounts as usual. The state losses did not exceed a trace. In Kansas, Johnston reported that it appeared in small amounts in nearly all fields late in the season. He mentioned Liberty and Hull-less oats as susceptible.

Colletotrichum graminicolum (Ces.) Wils., anthracnose. Slight amounts reported from Arkansas, Texas, and Wisconsin.

Erysiphe graminis DC., powdery mildew. Washington.

Helminthosporium avenae Eidam, leaf spot. In 1928, this disease was only reported from Connecticut, West Virginia, Florida, and Indiana. In the first three states, it was said to occur commonly. In West Virginia, it was thought to have caused a loss of about 10 per cent. By July practically all fields had lost all the leaves on the lower half of the plants, while even the upper leaves showed considerable infection. In some low, moist fields, seedling blight occurred. This disease has not been recognized heretofore as causing serious injury to oats in West Virginia, and this observation suggests that perhaps damage due to it may be overlooked in other states.

Oats - Other diseases

Tylenchus dipsaci (Kühn) Bast. In the Plant Disease Reporter 12: 20, June 15, 1928, what appears to be the first report of this nema on oats in this country is recorded from California. Since that time, Harold E. Thomas has sent in more detailed information concerning the occurrence. He states that the ranch has been cropped to oats almost continuously for the last twenty years, with an occasional summer fallow pasture or crop of wheat. The trouble was first noticed by the grower about ten years ago in a small spot in one field. Now it is widely scattered over the ranch. Another diseased condition was observed on the same ranch, the symptoms of which appear to be different from the one just mentioned, and which is causing much more damage. Specimens of this sent in to Washington showed Tylenchus dipsaci in the roots, and in addition, Cephalobus elongatus, another somewhat doubtfully parasitic nema commonly associated with decaying tissue. In one field, over 50 per cent of the crop was lost on account of this latter condition.

Blast (Non-par.). This common sterile condition of oat spikelets doubtless occurred more or less wherever oats were grown but it was only reported to the Survey from Pennsylvania, Arkansas, Kansas, and Montana. In Arkansas, two observers independently estimated the percentage reductions in yield in several varieties with the following results: Kherson, 3; Richland, 2; Gopher C. I. 2027, 1; Swedish Select, 5; Burt, 5; Iowar C. I. 847, 3; Iogren, 2; Nebraska 21, 5. In Kansas, Kherson was susceptible and Kanota very resistant, and the increased acreage of Kanota has brought about a reduction in the amount of blast. Losses were estimated as follows: 5 per cent, Montana; 3 per cent, Kansas; and one per cent, Pennsylvania.

Recent literature:

1. Godfrey, G. H. The susceptibility of certain grasses to nematodes. Pineapple News 2: 42. 1928.
2. Robertson, D. Observations on the disease of oats caused by the stem eelworm Anguillulina dipsaci (Kühn, 1857) Ann. Appl. Biol. 15: 488-498. Aug. 1928.
3. Samuel, Geoffrey. Two stunting diseases of wheat and oats. Jour. Dept. Agr. South Australia 32: 40-43. Aug. 1928.
4. Samuel, Geoffrey. Grey speck (manganese deficiency) disease of oats. Jour. Dept. Agr. South Australia 31: 696-705, 789-799. 1928.

C O R NSMUT, USTILAGO ZEAE (BECKM.) UNG.

About the average amounts of corn smut were reported by collaborators, although in the corn belt from Ohio westward to Kansas and in some of the dry land areas of western states such as Colorado, Arizona, and California more than last year and more than the average year was reported. The

estimates of losses in the accompanying table will show that the damage in these states particularly was considerable. In this connection, Immer and Christensen (5) in determining losses from smut infections have concluded that, in general, estimates of losses from corn smut by pathologists have been too low.

Table 77. Losses from corn smut as estimated by collaborators, 1928

Percentage loss	:	States reporting	:	Percentage loss	:	States reporting
15	:	California	:	2.5	:	Pennsylvania, Tennessee,
6	:	Kansas	:		:	Missouri
5	:	Arizona	:	2	:	Massachusetts, Minnesota
4	:	Ohio, Iowa, North	:	1.5	:	Utah, Wisconsin
	:	Dakota	:	1.25	:	New York
3	:	Virginia	:	1	:	Colorado, Michigan
	:		:	0.5	:	Delaware, West Virginia,
	:		:		:	Mississippi, Louisiana,
	:		:		:	Texas
	:		:	0.3	:	Maryland, Indiana

The following maximum percentages observed in individual fields emphasize the fact that this disease can cause a considerable amount of damage; Colorado 75, Minnesota 70, California 65, Arizona 50, Kansas 40, Pennsylvania 15, West Virginia 10, Florida 7. In Iowa counts made of 894 infected plants showed 9 per cent with ear infection only. The year before that counts made of 627 infected plants in the same locality showed only 1.1 per cent with ear infection only. General observations about the state also indicated that ear infection was more prevalent than in 1927. The average percentage of infected plants in the state was estimated as 8 and as will be seen from Table 77 the consequent reduction in yield was placed at 4 per cent.

Identical observations that smut was worst in the dry-land areas of Colorado and California are worthy of note.

Another significant observation is that of J. T. Trost of Indiana, who reported that the general condition of nitrogen starvation in the crop before tasselling was unfavorable for infection.

Recent literature

1. Eddins, A. H. Pathogenicity of multisporidial and monosporidial cultures of *Ustilago zeae* (Beckm.) Ung. (Abstract) *Phytopath.* 19: 91. Jan. 1929.
2. Garber, R. J., and M. M. Hoover. The relation of smut infection to yield in maize. *Jour. Amer. Soc. Agron.* 20: 735-746. July 1928.
3. Griffiths, M. A. Smut susceptibility of naturally resistant corn when artificially inoculated. *Jour. Agr. Res.* 36: 77-89. January, 1928.

Corn - Smut

4. Hanna, W. F. Studies in the physiology and cytology of *Ustilago zeae* and *Sorosporium reilianum*. (Abstract) *Phytopath.* 19: 91. Jan. 1929.
5. Immer, F. R., and J. J. Christensen. Determination of losses due to smut infections in selfed lines of corn. *Phytopath.*, 18: 599-602, 1928.
6. Immer, F. R., and J. J. Christensen. Influence of environmental factors on the seasonal prevalence of corn smut. *Phytopath.*, 18: 589-598. 1928.
7. Platz, G. A. The relation of oxygen to the germination of the chlamydospores of *Ustilago zeae* (Beck.) Unger. *Iowa State Coll. Jour. Science*, 2: 137-143. 1928.
8. Stakman, E. C., J. J. Christensen, and W. F. Hanna. Mutation in *Ustilago zeae*. (Abstract) *Phytopath.* 19: 106. Jan. 1929.

ROOT, STALK, AND EAR ROTS ASSOCIATED WITH *FUSARIUM MONILIFORME*,
GIBBERELLA SAUBINETII, *FUSARIUM* SPP, *PYTHIUM ARRHENOMANES*
 DRECHS., AND POSSIBLY OTHER ORGANISMS.

More light is gradually being thrown on this complex of diseases whereby some of the individual diseases may be distinguished. The work of Valteau, Karraker and Johnson (4), Branstetter (1), Johann, Holbert and Dickson (3) and Drechsler (2) has resulted in the separating out of *Pythium arrhenomanes* as a cause of root rot. Just how widespread and how important this is as a cause of root rot remains to be seen. The causes of the seedling blights and also the ear rots are gradually becoming better known. Taken all together they caused a very considerable loss in 1928 as evidenced by the figures in table 78.

Corn - Root - Stalk - and ear rots

Table 78. Estimated losses from ear rots and root rots of corn as reported by collaborators, 1928.

State	Estimated percentage loss		Total
	Root rots	Ear rots	
Massachusetts	1	t	1 +
Pennsylvania	3	3.5	6.5
Delaware	1.5	1.5	3
Maryland	5	7	12
Virginia	3	3	6
West Virginia	3	2	5
Georgia	1	-	1
Florida	5	5	10
Ohio	1	1	2
Indiana	1	4.5	5.5
Michigan	t	t	t
Wisconsin	2	2	4
Minnesota	t +	1	1 +
Iowa	0	11.5	11.5
Missouri	1.5	t	1.5 +
Kansas	5	4	9
Mississippi	5	2	7
Louisiana	5	5	10
Texas	1	5	6
Montana	t	0	t
Arizona	0	0	0
Washington	t	t	t
Oregon	t	0	t
California	-	10(pink rot)	10

Recent literature

1. Branstetter, B. B. Corn root rot studies. Missouri Agr. Exp. Sta. Res. Bul. 113: 1-80. Nov. 1927.
2. Drechsler, C. *Pythium arrhenomanes* n. sp., a parasite causing maize root rot. Phytopath. 18: 873-875. Oct. 1928.
3. Johann, H., J. R. Holbert, and J. G. Dickson. A *Pythium* seedling blight and root rot of dent corn. Journ. Agr. Res. 37: 443-464. Oct. 15, 1928.
4. Valleau, W. D., P. E. Karraker and E. M. Johnson. Corn root-rot, a soil-borne disease. Jour. Agr. Res. 33: 453-476. Sept. 1, 1926.

BACTERIAL WILT, *APLANOBACTER STEWARTII* (EFS.) McCUL.

Reported from Maryland, West Virginia, Indiana, Iowa, Missouri, Kansas, and Texas. The most interesting fact reported was the unusual prevalence of the disease in Iowa, Missouri, and Kansas. According to the collaborators of those states, the area where the disease occurred was more or less continuous, as in Iowa it was reported only from three southern counties next to the Missouri line, and in Kansas it occurred particularly in fields in the north-eastern part of the state. The reports of the three collaborators from those states are as follows:

Missouri: First serious outbreak of this disease in Missouri for several years. One field showed at least one-half of stand wilted with probably more going down later. Had not occurred here heretofore (i. e., in the same field). Organism easily isolated. (I. T. Scott)

Iowa: Specimens received from three counties next to the Missouri line. This is the first collection of this disease in Iowa in recent years. It was present only on the sweet corn and is doing great damage. Seed source has not been traced down as yet. (Porter)

Kansas: This disease more severe in garden grown sweet corn than ever reported before. (Johnston)

Golden Bantum and Country Gentleman sweet corn were the varieties reported especially susceptible. In Indiana Evergreen and Narrow Grain were said to show resistance.

Recent literature:

1. Reddy, C. S., and J. R. Holbert. Differences in resistance to bacterial wilt in inbred strains and crosses of dent corn. Jour. Agric. Res., 36: 905-910. 1928.

DRY-ROT, *DIPLODIA ZEAE* LEV.

The states reporting occurrence and estimates of losses are given in the following table:

Table 79. Losses from dry-rot of corn as estimated by collaborators, 1928.

Percentage:		Percentage:	
loss	States reporting	loss	States reporting
5	: Iowa, Florida	1	: Maryland, Ohio
3	: Indiana	t	: Pennsylvania, Missouri
2	: West Virginia (includes	:	:
	: Gibberella), Mississippi:	:	:
	: Kansas	:	:

Corn -- Dry-rot, *Diplodia zeae* Lévl.

Delaware, Mississippi, and Indiana reported more than the average, on account of warm and rainy weather, and in Delaware and Florida the statements are made that it was commonly associated with corn which had been blown down by hard winds. In the latter state it was said to be probably the most destructive ear rot disease.

Late Reid and Johnson County White were reported by Trost as very resistant in Indiana, while the sweet corns and early maturing dents were very susceptible.

Seed treatments continued to result in reductions in the amount of this disease (1, 2, 3).

Recent literature

1. Holbert, J. R., C. S. Reddy, and B. Koehler. Chemical-dust seed treatments for dent corn. U. S. Dept. of Agric. Circ. 34. 5 pp. 1928.
2. Melhus, I. E., C. S. Reddy, W. P. Raleigh, and L. C. Burnett, Iowa Agr. Exp. Sta. Circ. 108; 16 pp. 1928.
3. Reddy, C. S. and J. R. Holbert. Further experiments with seed treatments for sweet-corn diseases, Jour. Agr. Res. 36: 237-247. 1928.

BROWN SPOT, *PHYSODERMA ZEAE-MAYDIS* SHAW

Brown spot was reported from the southern states of North Carolina, Georgia, Florida, Mississippi, and Louisiana and from Iowa, Missouri, and Kansas. As usual the greatest damage occurred in the Gulf Coast States, with 5 per cent estimated loss in Florida, 3 in Mississippi, and 1.6 in Georgia. Only traces of loss were reported from the other states, with the exception of Louisiana, where the disease was said to be very general but no attempt was made to estimate the loss.

On an inspection trip in northern and western Florida, A. H. Eddins observed the highest percentage of infection on a local strain of the variety Hastings at Gainesville, where 48 per cent of the plants were infected. He estimated the average percentage of infection for the state at 15, and the loss at 5.

The occurrence in Iowa, where it was found in two fields, is the first observed during recent years.

RUST, *PUCCINIA SORGHII* SCHW.

Rust was reported from widely scattered states, from Maine to Florida and westward as far as Colorado. No reports were received from the Pacific Coast. The report from Maine stated that it has not been considered common in that state but with the adoption of the Golden Bantam for commercial

Corn - Rust, *Puccinia sorghi* Schw.

canning more complaints of severe injury are being received. Sweet corn was commonly reported as more severely affected than field corn. The only state reporting losses of over a trace was Iowa with 0.2 per cent.

Recent literature

1. Stakman, E. C., J. J. Christensen, and H. E. Brewbaker.
Physiologic specialization in *Puccinia sorghi*. *Phytopath.*
18: 345-354. 1928.

OTHER DISEASES

Bacterium dissolvens Rosen, bacterial stalk-rot. Reported from Mississippi and Arkansas. As high as 10 per cent observed in one Arkansas field.

Basisporium gallarum Molliard, cob rot. Indiana, Iowa, and Kansas. In the two former states it occurred generally, causing total losses estimated at 1 and 5 per cent respectively. In Kansas a trace of loss was estimated. Inbred strains of Johnson County White were said to be very susceptible in Indiana. In Iowa it was associated with down corn resulting from severe hail and wind storms.

Cephalosporium acremonium Cda., black bundle. New York, Pennsylvania (0.5 per cent loss), Indiana (general, trace loss), Kansas (slight amounts in nearly all river-bottom fields of northeastern Kansas, trace loss), Montana.

Helminthosporium turcicum Pass., leaf-blight. Reported from Connecticut, New York, Pennsylvania, Virginia, West Virginia, Indiana. In Virginia one case was observed where three acres in the middle of a field was almost a total loss on account of this leaf blight. The loss for the state however was estimated at only a trace. In West Virginia it was reported by Archer as being one of the most severe diseases of corn of the year. It was widely distributed and in the southern part of the state especially it resulted in premature ripening. The loss was estimated at 6 per cent for the state. In Indiana it appeared to be confined more or less to the southern portion. Some fields were observed with all plants infected but the state loss was estimated at merely a trace.

Sorosporium reilianum (Kühn) McAlp., head smut. This smut is spreading in California, according to Mackie. Five per cent infection observed in one field.

Mosaic (virus). Reported from southern Louisiana and Mississippi, fields relatively near infected sugar cane.

Translucent leaf spot, non-par. Generally distributed and rather common in West Virginia fields, according to Archer. It has the appearance of being a bacterial disease but detailed examinations failed to reveal bacteria.

Recent literature

1. Branstetter, B. B. Corn root rot studies. Missouri Agr. Exp. Sta. Res. Bull. 113. 30 pp. Nov., 1927.
2. Burger, A. A. Corn root rot. Successful Farm. 26 (4): 11, 25. Apr. 1928.
3. Dickson, James G., P. E. Hoppe, J. R. Holbert, and George Jansen. The influence of environment during maturation upon predisposition to seedling blight in wheat and corn strains. (Abstract) Phytopath. 19: 79. Jan. 1929.
4. Gilbert, B. B., and F. T. McLean. A 'deficiency disease': the lack of available manganese in a lime-induced chlorosis. Soil Science 26: 27-31. 1928.
5. Holbert, J. R., and W. L. Burlison. Studies of cold resistance and susceptibility in corn. (Abstract) Phytopath. 19: 105 Jan. 1929.
6. Holbert, J. R., C. S. Reddy and B. Koehler. Chemical-dust seed treatments for Dent corn. U. S. Dept. Agr. Circ. 34. 5 p. Feb. 1928.
7. Hoppe, P. E. Inheritance of resistance to seedling blight of corn caused by *Gibberella saubinetii*. (Abstract) Phytopath. 19: 79-80. Jan. 1929.
8. Ireland, J. C. Controlling influences in corn rot problems. Bot. Gaz. 86: 249-269. Nov. 1928.
9. Johann, Helen. Further studies on *Penicillium* injury to corn. (Abstract) Phytopath. 19: 105. Jan. 1929.
10. Johann, Helen. *Penicillium* injury to corn seedlings. Phytopath. 18: 239-242. Feb. 1928.
11. Melhus, I. E., C. S. Reddy, W. P. Raleigh, and L. C. Burnett. Iowa Agr. Exp. Sta. Circ. 108. 16 pp. 1928.
12. Melhus, I. E., F. H. Van Haltern and D. E. Bliss. A study of *Sclerospora graminicola* (Sacc.) Schroet. on *Setaria viridis* (L.) Beauv. and *Zea mays* L. Iowa Agr. Exp. Stat. Res. Bull. 111: 297-338. Apr. 1928.
13. Miller, L. P. Manganese deficiency in sand cultures. Amer. Fertilizer, 63 (7): 21-22. 1928.
14. Stahl, C. F. A mosaic on corn. Proc. Conf. Intern. Soc. Sugar Cane Techn. 2: 85-87. 1927.

Corn - Other diseases

15. Storey, H. H. Transmission studies of maize streak disease.
Ann. Appl. Biol. 15: 1-25. Feb. 1928.

F L A X

Fusarium lini Bolley, wilt. Wisconsin, Minnesota, Iowa, North Dakota, Kansas, and Montana. The only states estimating more than a trace of loss were North Dakota with 5 per cent and Minnesota with 1 per cent. As high as 75 per cent infected plants were noted in one Minnesota field, and 10 per cent in a Kansas field. In Iowa, where flax is increasing as a crop, only one case of wilt came to attention. Pathologists there are indexing the various varieties for their resistance..

Melampsora lini (Schum.) Desm., rust. Wisconsin, Minnesota, North Dakota, Montana, and Oregon. It was said to be much more prevalent in Minnesota than usual, especially in the southern half of the state. Ten per cent reduction in yield was estimated. In North Dakota it occurred generally on the susceptible varieties, the newly developed varieties showing good resistance. Three per cent loss was estimated in that state. In Oregon, Barss estimates 0.1 per cent loss.

Phlyctaena linicola Speg., pasmo. Unusually severe in Minnesota where the damage ranged from a trace to 20 per cent in individual fields. The injury took the form of blighting of the bolls as well as of the stem. Traces of loss were estimated in Wisconsin and North Dakota.

Heat canker, nonpar. Montana.

Tipburn, undet. Tipburn of young plants from 10 to 15 inches high were reported affecting 10 per cent of the plants in a North Dakota field. The young growing tips and flower buds were affected. It is uncertain as to whether or not this disease is caused by an organism.

Recent literature

1. Henry, A. W. Reaction of *Linum* species of various chromosome numbers to rust and powdery mildew. (Abstract) Scient. Agric. 8: 460-461. 1928.
2. Hiratsuka, N. Studies on the flax rust. Reprinted from Trans. Sapporo Nat. Hist. Soc. 10 (1): 1-27. 1928.
3. Homma, Yasu. On the powdery mildew of flax. Bot. Mag. Tokyo 42: 331-334. 1928.

S O R G H U MCOVERED KERNEL SMUT, *SPHACELOTHECA SORGI* (LINK) CLINTON

Covered kernel smut was reported from the following states. The figures in parentheses indicate estimated percentages reduction in yield. Wisconsin (trace), Missouri (trace), Texas (2), Louisiana, Arkansas (3), Colorado (1.5), New Mexico, California (2). Maximum percentages of infection in individual fields were reported from Kansas, Colorado and California, as 45, 30 and 60 per cent respectively.

In New Mexico Crawford reports that the disease is becoming eliminated by the use of copper carbonate dust. Only a trace of it can now be found. In Kansas, Johnston states that physiologic forms which attack Milo, Hegari, and Feterita, which were formerly thought to be immune, have been isolated. In California, Feterita still seems to be immune but the formerly immune dwarf milos are becoming attacked to some extent.

Recent literature

1. Johnston, C. O., and L. E. Melchers. The control of sorghum kernel smut and the effect of seed treatments on vitality of sorghum seed. (Kansas Agr. Exp. Sta. Tech. Bul. 22: 37 pp. 1928.

HEAD SMUT, *SOROSPORIUM REILIANUM* (KÜHN) McALP.

In Kansas, occasional smutted heads were found, especially in the western part of the state, and mostly in the sorgos. In Texas a trace was reported. It was also found to a slight extent in eastern New Mexico. From California W. W. Mackie reported that it is increasing in amount and range, being found from Los Angeles County to Yolo County. The milos were said to be immune while all of the saccharine sorgos were very susceptible.

R I C E

Helminthosporium oryzae Van Breda de Haan, blight. Common in all fields in Florida. Very destructive in seedling stage (Weber).

Piricularia oryzae Br. & Cav., blast. Florida, Texas, and Arkansas. In Florida it seemed to be common wherever the host was grown and in Arkansas it was found to a limited extent particularly in fields affected with stem rot.

Sclerotium oryzae Catt., stem rot. Arkansas. Losses severe in occasional fields but on the whole not very much damage.

Tilletia horrida Tak., black smut. Arkansas. Traces found in the fields examined but of no particular economic importance. The variety Fortuna appears most susceptible.

Rice - Misc! diseases

Ustilaginoidea virens (Cke.) Tak., false smut. V. H. Young reported that he has never seen this disease in Arkansas; although he has looked for it carefully. The disease has been reported from Louisiana but was not observed in 1928, according to Tims.

Straighthead, non-par. Patches of rice showing straighthead observed in some fields in Arkansas, but no considerable loss this year. (E. C. Tullis)

Glume blotching and spotting, cause unknown. Blotching and spotting of glumes accompanied by kernel discoloration or sterility observed in Arkansas, according to Tullis.

Recent literature

1. Abe, T. Experimentelle Studien über die Pilzschäden von Reissämlingen. IV. Jour. Plant Protect., 14: 1-12. 1927. (Japanese.) (Abs. in Japanese Journ. of Botany, 4: 1. 1928).
2. Hemmi, T. and T. Abe. An outline of the investigations on the seed and seedling-rot of rice caused by a watermould, *Achlya prolifer* Nees. Jap. Jour. Bot. 4: 113-123. Oct. 1928.
3. Hemmi, T., and F. Soto. Experiments relating to stimulative action by the causal fungus of the 'bakanae' disease of rice. (Preliminary report.) Proc. Imper. Acad. (Tokyo). 4: 181-183. 1928.
4. Nisikado, Yosikazu. Comparative studies on the *Helminthosporium* diseases of rice in the Pacific regions (Abstract) Proc. Third Pan-Pac. Sci. Cong. Tokyo II: 2113. 1928.
5. Nisikado, Y., and C. Miyake. Studies on the uspulun treatment of cereal seeds against the *Helminthosporioses*. Agric. Studies 11: 36-64. 1927. (Japanese). (Abs. in Jap. Jour. Bot. 4 (1): 1928.
6. Tuteff, I. Ein Versuch zur Bekämpfung der Fleckenkrankheit des Reises. Zeitschr. Pflanzenkr. 38: 279-284. 1928.

D I S E A S E S O F F O R A G E C R O P SA L F A L F ALEAFSPOT, PSEUDOPEZIZA MEDICAGINIS (LIB.) SACC.

Pseudopeziza leafspot was reported from sixteen states scattered throughout the country. In most cases it was of slight importance, but in Iowa it probably caused a loss of 3 per cent, according to R. H. Porter. Early cutting to reduce loss was necessary both in Iowa and Virginia.

YELLOW LEAF BLOTCH, PYRENOPEZIZA MEDICAGINIS FCKL.

Only four states reported this disease in 1928, West Virginia, Iowa, Kansas, and Montana. It has not been reported from West Virginia before. According to Young, it was common and sometimes serious in late-cut fields in western Montana.

BACTERIAL WILT, APLANOBACTER INSIDIOSUM MCCULLOCH.

Bacterial wilt was reported from Wisconsin, Iowa, Missouri, Kansas, Colorado, and Utah, and a wilt occurring in New Jersey was reported as being caused by Bacterium sp. In Wisconsin, where it is important only in the southern counties, there was more than usual following severe winter injury. R. H. Porter estimated that bacterial wilt and crown rot together caused a loss of 25 per cent in Iowa, and reported that it was found in several new localities in the state. Weimer, in a report to the Office of Vegetable and Forage Diseases, said that bacterial wilt appeared to be more prevalent in eastern Kansas than at any time since its discovery. It was by far the most important disease of alfalfa in that section. Many plants, in fact whole fields, were destroyed during the winter, apparently by this disease. The amount of wilt decreases toward the west and there is very little in upland alfalfa in the drier sections of the State. The winter-hardy variety Grimm is one of the most susceptible to bacterial wilt. In Colorado, the loss was estimated at 2 per cent. Richards reported that the disease was very important in alfalfa under irrigation in the northwestern portion of Salt Lake County, Utah. He says, "In a survey on the dates of August 25 to 27 . . . a total of 28 fields were visited. Twenty-five (90 per cent) showed the bacterial wilt. Of these 25 fields, 19 showed the trouble in quantities varying from 1 to 70 per cent of plants affected. Two fields were found which were very severely affected with from 60 to 70 per cent of plants either dead or diseased. . . . With further spread, bacterial wilt may become a very important factor in Utah alfalfa hay and seed production. Damage is especially evident in areas with abundant water supply."

Recent Literature .

1. Jones, F. R. Development of the bacteria causing wilt in the alfalfa plant as influenced by growth and winter injury. Jour. Agr. Res. 37: 545-569. Nov. 1, 1928.
2. Jones, F. R., and J. L. Weimer. Bacterial wilt and winter injury of alfalfa. U. S. Dept. Agric. Circ. 39. 8 pp., 1928.

LEAF AND STEM NEMATODE, TYLENCHUS DIPSACI (KÜHN) BASTIAN

Colorado, Utah, New Mexico, and Oregon reported Tylenchus dipsaci in 1928.

Utah: Of the 67 fields studied in the Hunter, Magna, and Murray districts of Salt Lake County in 1928, 27 fields or 40 per cent showed the nematode. Three of the 27 infested fields showed the

Alfalfa - Leaf and stem nematode.

disease in every plant examined. A number of the others exhibited heavy percentages. Poor stands and stunted plants characterized most of the fields in which the disease was severe. The studies show the disease to be an important factor in decreasing yields in fields older than three or four years. One 2-year-old field was observed showing practically 100 per cent infection. With a more thorough study of the fields, traces of the nematode would be found without doubt in a much greater percentage than is here indicated. Total loss 0.5 per cent. (Richards).

Oregon: Occurs in four counties. Loss 0.5 per cent, maximum infection observed 90 per cent. This disease is gradually spreading to new districts and new fields. The damage in some cases is very heavy. Some growers are becoming alarmed. Some fields have dropped in yield from eight tons of hay to one ton per acre because of the nematode. (McKay).

Recent literature:

1. Noble, R. J. Root knot and other eelworm diseases. Agr. Gaz. New South Wales 39: 546-550. July 1928.

WITCHES' BROOM, CAUSE UNKNOWN.

The following description of a "witches' broom" disease of alfalfa occurring in Utah is by B. L. Richards:

This disease has not been reported previously from Utah and so far as the writer is aware, no reference has been made to it from other districts.

The disease was first observed by the writer in two fields in Salt Lake County in 1924 although, owing to the small number of plants involved, little attention was given to it. Attention was again focused upon the trouble during the survey in the Murray district, Salt Lake County, between the dates of August 26 and 27 in 1928 at which time it was discovered in four of the eighteen fields visited. In three of these fields, affected plants were found in such numbers as to indicate rather clearly that the disease was an important factor in reducing the stand. One of the three fields observed showed an average infestation of approximately 15 per cent with local spots exhibiting as high as 50 per cent affected plants.

The disease expresses itself in a marked increase in number of stems which arise from the axis of the leaves, from the axis of the scales at the base of the stem, and adventitiously throughout the whole circumference of the crown. Several shoots in fact might develop from a single leaf axis along the old stem stalks left from a first or second cutting. The stems from a single diseased crown may vary in number from 50 to as high as 300. These features justify the name "witches' broom."

Alfalfa - Witches' Broom.

Diseased stems are uniformly shorter than stems from healthy plants and in the advanced stages of the disease may not exceed 3 to 5 inches in height. Diseased stems also become very spindly and may be so reduced in diameter as to be unable to maintain an upright position. Leaves of affected plants are uniformly small and more rounded than normal. Definite marginal yellowing and purpling of the leaves also characterizes the disease in its advanced stages.

The trouble appears to arise rather suddenly as a systematic type of disease in which all stems are equally affected and all meristematic tissue in the plant is stimulated into activity, thus resembling somewhat certain diseases of the virus type. The various stages of the disease exhibited by the affected plants, from slight injury to severe stunting and early death, indicate that the trouble is a specific disease and not a genetic variation to which it was earlier attributed.

A more detailed description of the disease is being prepared for publication in Phytopathology.

It may be mentioned that in 1925 Hungerford reported under the name of a "witches' broom" a disease causing slender bushy growth of alfalfa in a few fields in Elmore County, Idaho. This is the only other report of a similar trouble in the Survey files.

CROWN AND ROOT ROTS AND WINTER INJURY.

Winter injury and crown and root rots following it and associated with various organisms were responsible for very severe damage in some states. The heaviest loss, 50 per cent, was reported from West Virginia where the crop is comparatively new and little is known regarding suitable varieties. According to Archer, all fields in the mountainous parts of the State were severely affected by crown rot but those in the eastern Panhandle were practically free. Plants in a certain type of shale soil are particularly liable to heaving which makes them more subject to crown rot. In one place, a two-year old field in the shale soil was nearly dead while a three-year old field on a black limestone ridge a short distance away was in perfect condition.

Other percentages of loss reported are Utah 15, Iowa 12, Maryland 10, Missouri 4, Colorado 3, Texas and North Dakota 1. The trouble was also said to be important in Virginia, Kentucky, Arkansas, Wisconsin, and Minnesota. Richards states that root rots of various types are an important factor in reducing alfalfa yield in Utah, especially in the older fields. Observations in 1928 in the Hunter and Magna districts indicate that not more than 60 per cent of the possible yield is being obtained by growers, due largely to lack of proper rotation. Heavy losses are sustained through neglect to break up and reseed fields when the stand becomes so thin as to be unprofitable.

Alfalfa - Root and Crown Rot

Valleau and Fergus in Kentucky report that winter killing was severe in 1927-28. They state that "The most severe injury appeared to be in the fall-developed shoots which furnished buds for the next spring's growth. Death appeared to have resulted from infection by the 'black-stem' organism (common on clovers, alfalfa, and sweet clover) which weakened the shoots sufficiently to cause their death during the winter. Vigorous plants on fertile soil withstood damage and survived better than plants on poorer soil."

In Wisconsin, Vaughan reported that the Agronomy Department estimated 100,000 acres killed out because of lack of snow cover and complication with wilt in some sections.

Recent literature

1. Jones, F. R. Winter injury of alfalfa. Jour. Agr. Res. 37: 189-211. Aug. 15, 1928.

OTHER DISEASES

Ascochyta imperfecta Pk., leafspot. West Virginia: first report for the state, many fields with all the lower leaves affected. (W. A. Archer).

Bacterium medicaginis (Sack.) EPS., bacterial blight. The only report of this disease this year is from Utah, where, according to B. L. Richards, it caused a loss of 1.5 per cent. The maximum infection observed was practically 100 per cent.

Caconema radiculicola (Greef) Cobb (Heterodera radiculicola (Greef) Müll.). Root knot is important in Texas except where the Hairy Peruvian variety is grown. Loss 0.5 per cent. (J. J. Taubenhaus).

Cercospora medicaginis Ell. & Ev., leaf spot, was reported from West Virginia for the first time. Infection was scattered and slight. (W. A. Archer). The disease also occurred in Texas and Mississippi.

Colletotrichum trifolii Bain, anthracnose. New Jersey, Mississippi.

Cuscuta sp., dodder, reported from Texas and Wyoming.

Fusarium spp., Fusarium wilt. (See also crown and root rots and winter injury above). "This is believed to be the most serious disease of alfalfa in Missouri. Causal organisms have been isolated. Loss 4 per cent." (I. T. Scott).

Fusarium oxysporum var. medicaginis Weimer was described (7) as the cause of a typical Fusarium wilt of alfalfa in northeastern Mississippi. As many as 15 per cent infected plants have been found in a field. Due to its limited distribution, the disease is not of very great economic importance at the present time, but no soil or climatic factor is known which would prevent its spread to other alfalfa growing regions.

Alfalfa - Other Diseases.

Macrosporium sp., leaf spot. West Virginia! Slight occurrence in several fields in the Eastern Panhandle. Associated with Phleospora hyalospora Ell. & Ev. (W. A. Archer).

Peronospora trifoliorum D By., downy mildew. Loss 0.5 per cent in Utah, also reported from New Jersey, Mississippi, and Montana.

Phymatotrichum omnivorum (Shear) Duggar (Ozonium omnivorum Shear), root rot, caused 30 per cent loss in Texas according to Taubenhaus and Dana. Crawford stated that it was severe in the Pecos Valley in New Mexico. Considerable acreage was plowed up. The Arizona News Letter reports the disease from Arizona and California. In California, according to the issue for September 30 (page 2) "Mr. Scott reports that the thorough survey made in the Coachella and Imperial Valleys resulted negatively as far as root rot was concerned. However, the disease was found quite widespread in the Palo Verde Valley and in the Bard district. Cotton and alfalfa were the crops attacked most severely."

Rhizoctonia sp. J. E. Kotila (4) describes a Rhizoctonia isolated in 1934 from root rot diseased alfalfa plants in Michigan. A culture of a similar Rhizoctonia was received from Minnesota. The mycelium is hyaline and cannot be mistaken for that of R. crocorum. The perfect stage formed in pure culture differs in many respects from Corticium vagum.

Urophlyctis alfalfae (Lagh.) Magn. In 1928 reported to the Survey from Utah only. Richards stated that the disease was found in 34.3 per cent of the 67 fields examined in the Hunter and Magna districts of Salt Lake City. In some fields it was very severe, from 70 to 80 per cent of the plants being affected. It was especially prevalent in some old alfalfa fields and is undoubtedly an important factor in decreasing the stand. The loss for the State was estimated by Richards at 2 per cent. Graff (3) reports the disease from Montana, which is a new record as far as the Survey files are concerned.

All white plants (cause unknown), Park County, Montana, apparently not so abundant as usual. The white, purple, or yellow stems and leaves are very conspicuous. Affected stems bear both normal and albino leaves. Affected plants bear some stems that show no albino symptoms. Since the abnormality does not seem to appear in the second and subsequent cuttings, it is probably not genetic. (P. A. Young.)

Curly top (due to sugar beet curly top virus). Natural and artificial infection of Hairy Peruvian was reported from California (6).

Leaf hopper injury. General but of slight importance in New Jersey, most severe in southern part.

Streak, said to be of bacterial origin, was reported from Texas.

White spot (non-par.), reported from Iowa, Montana, Washington.

Yellow top (cause unknown), Washington.

Alfalfa - Other Diseases

Recent literature on other diseases:

1. Bisby, G. R., and I. L. Connors. Plant diseases new to Manitoba. Sci. Agr. 8: 456-458. Mar. 1928. Pleosphaerulina briosiana Poll., Peronospora trifoliorum D By.
2. Carne, W. M. Additions to the plant diseases of south-western Australia. Jour. Roy. Soc. Western Australia, 14: 23-28. 1927. Rhizoctonia bataticola.
3. Graff, P. W. Contributions to our knowledge of Western Montana fungi - II. Mycologia 20: 158-179. 1928. Urophlyctis alfalfae, Peronospora trifoliorum.
4. Kotila, J. E. Concerning a Rhizoctonia which forms hymenial cells and basidiospores in culture. Science n. s. 67: 490. May 11, 1928.
5. Monteith, J. Clover anthracnose caused by Colletotrichum trifolii. U. S. Dept. Agr. Techn. Bul. 28. 26 pp. 1928.
6. Severin, Henry H. P., and Charles F. Henderson. Some host plants of curly top. Hilgardia 3: 339-392. June 1928.
7. Weimer, J. L. A wilt disease of alfalfa caused by Fusarium oxysporum var. medicaginis, n. var. Jour. Agr. Res. 37: 419-433. Oct. 1, 1928.

C L O V E RANTHRACNOSE DISEASES, COLLETOTRICHUM TRIFOLII BAIN AND GLOEOSPORIUM CAULIVORUM KIRCH.

The Colletotrichum was reported from West Virginia, Kentucky, Mississippi and Texas. In West Virginia it was generally distributed and caused severe damage to the crop. In many fields the second crop was a complete failure. Many plants were completely killed owing to attack of the crown. A loss of 20 per cent was estimated for the State.

Varietal tests at Morgantown showed variations in susceptibility, and in Kentucky also various strains of clover showed marked differences. Minnesota and Michigan strains were killed out on experimentation farms at Lexington, Kentucky while southern strains and locally adapted Kentucky strains were very resistant.

From Maine the report was received that anthracnose injured clover severely in the varietal test plots there. It was reported under the name Gloeosporium caulivorum.

Recent literature

1. Monteith, J. Jr. Clover anthracnose caused by *Colletotrichum trifolii*. U. S. Dept. Agr. Techn. Bull. 28: 26 pp. Feb. 1928.
2. Sampson, K. Comparative studies of *Kabatella caulivora* (Kirchn.) Karak. and *Colletotrichum trifolii* Bain and Essary, two fungi which cause red clover anthracnose. Trans. Brit. Mycol. Soc. 13: 103-142. Mar. 1928.

OTHER DISEASES

Bacterium trifoliorum L. R. Jones et al. District of Columbia on white clover.

Caconema radiculicola (Greef) Cobb (*Heterodera radiculicola* (Greef) Muell.), root knot. Washington.

Cercospora medicaginis Ell. & Ev., leaf spot. Severe infection seen in one field of red clover in West Virginia. First report for the state to the Survey. (Archer)

Cercospora zebrina Pass., leaf spot. Serious on alsike clover in eastern New York. (Horsfall)

Erysiphe polygoni DC., powdery mildew. Massachusetts, New Jersey, West Virginia, Mississippi, North Dakota, South Dakota, Montana, Washington. Dates of earliest recorded appearance reported are early in June, West Virginia; June 7, New Jersey; July 3, Mississippi; July 26, Massachusetts.

Macrosporium sarcinaeforme Cav., leaf spot. Widespread infection in West Virginia, with moderate to severe damage to the leaves. Volunteer plants were seemingly more susceptible to infection. Total loss a trace. (Archer)

Phyllachora trifolii (Pers.) Eckl., sooty spot. New Jersey, on alsike and white clovers. Common in West Virginia on white clover, first report for the State. On white and red clover in Montana.

Phymatotrichum omnivorum (Shear) Dug., rootrot. Texas.

Pseudopeziza trifolii (Biv.) Eckl. West Virginia on red clover, Washington.

Sclerotinia trifoliorum Eriks., root rot. Washington.

Stagonospora carpathica Baeuml., leaf spot. Apparently the first report for West Virginia on white clover. Infection slight.

Clover - Other diseases

Uromyces fallens (Desm.) Kern, rust. On red clover in New Jersey, and West Virginia.

nerviphila

Uromyces nerviphila (Grognot) Lagh. (*Pucciniola nerviphila* (Grognot) Arth.), rust. On white clover, Mont.

Uromyces trifolii (Hedw. f.) Lév. (*U. hybridi* Davis), rust. On alsike clover, Massachusetts, New York, Montana. On white clover, West Virginia, Montana.

Mosaic (virus). Reported from West Virginia on red clover, New Jersey, South Dakota on red clover, Montana on red and alsike clovers.

Recent literature

1. Alcock, N. L. & Martin, M. S. A seed-borne disease of clover (*Trifolium repens* L.) Trans. Bot. Soc. Edinburgh. 30: 13-18. 1928.
Sclerotinia sp.
2. Bisby, G. R., and I. L. Connors. Plant diseases new to Manitoba. Sci. Agr. 8: 456-458. March 1928.
Erysiphe polygoni, *Uromyces fallens*
3. Campbell, C. Sull 'albinismo nei fiori del "Trifolium incarnatum" L. e in altre piante coltivate e sul valore sistematico della diversa pigmentazione. Arch. Bot. Sistem. Fitogeogr. e Gen. 4: 87-91. June 1928.
4. Mains, E. B. Observations concerning clover diseases. Proc. Indiana Acad. Sci. 37 (1927): 355-364. 1928.
5. Neuweiler, E. Switzerland: a new red clover disease. Internat. Bull. Plant Protect. 2: 2. 1928.
Fusarium trifolii, hitherto known only in Russia.
6. Severin, Henry H. P., and Charles F. Henderson. Some host plants of curly top. Hilgardia 3: 339-392. June 1928.
7. Taslim, Md. Stem-rot of berseem caused by *Rhizoctonia solani* Kuhn. Bull. Agr. Res. Inst. Pusa. 180. 8 p. 1928.
Trifolium alexandrinum.

C O W P E A

Bacterium vignae Gardner & Kendrick, bacterial spot. Florida, Indiana.

Cercospora sp., leaf spot. Georgia - common and causing defoliation in some older plantings. Texas - fairly prevalent.

Erysiphe polygoni DC., powdery mildew. Texas.

Fusarium sp., root rot. California, general in the San Joaquin valley, causing severe damage. (Kendrick).

Helminthosporium sp., leaf spot. Georgia. Spread rapidly through a late planting which followed a vegetable garden. Caused 25 per cent loss of leaves and also affected stems. A species of Helminthosporium was found consistently associated with the spot. (Boyd)

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas: Very susceptible host.

Rhizoctonia sp., Georgia: First time observed in state. Caused severe spotting of leaflets and stems in one small field where cowpea followed vegetables in rotation. Resembled Rhizoctonia blight reported on beans and kudzu. A Rhizoctonia sp. was also reported from Texas.

Uromyces vignae Barclay, rust. Texas, very prevalent. Kansas, small amount on late cowpeas at Manhattan, October 2.

Mosaic (virus). New Jersey, Indiana: transmitted through seed of Arlington variety collected from mosaic plants in 1926 (Gardner). Louisiana, Kansas: considerable in experimental plots at Manhattan.

Recent literature

1. Severin, Henry H. P., and Charles F. Henderson. Some host plants of curly top. Hilgardia 3: 339-392. June 1928.
2. Tehon, L. R., and Stout, G. L. An ascomycetous leaf spot of cowpea. Phytopath. 18: 701-704. Aug. 1928.
Leptosphaerulina vignae.

SOY BEAN

Bacterium phaseoli sojense Hedges, bacterial pustule. North Carolina; wherever soybeans are grown, on all common varieties. Indiana; slightly important. Mississippi; 3 per cent reduction in yield estimated. Louisiana; occurs generally over sugar cane belt, but less conspicuous than Cercospora diazu.

Cercospora diazu Miura, leaf spot. This comparatively new disease was more widely recorded than heretofore. North Carolina: Found abundantly on pods as well as leaves of Ootootan variety at Raleigh, caused much defoliation on this which seems to be the most susceptible variety. Georgia: Common in fields of Habersham County, causing premature defoliation in some cases. First observed July 21. Mississippi: From 60 to 75 per cent of the leaves in a 35-acre field showed spots. Louisiana: Quite widespread over south-

Soy bean

western part of the state, where very few plants are entirely free. Considerable defoliation especially on the Laredo variety.

Peronospora manshurica (Naoum.) Syd. in lit (*P. sojae* Wolf) The first report from West Virginia was sent in by W. A. Archer, who reported it as occurring rather generally throughout the state and in southeastern Ohio. S. G. Lehman of North Carolina reported its observation in every field of the Herman (Haberlandt) variety visited. The disease was collected at Experiment, Georgia, July 11, and M. W. Gardner reported its first observation in Indiana.

Phymatotrichum omnivorum (Shear) Dug., root rot, Texas.

Sclerotium rolfsii Sacc., Stem-rot. Mississippi, Louisiana, much less observed than usual.

Septoria glycines Hermi, brown spot. North Carolina: Abundant on the unifoliate and first trifoliate leaves of Herman variety but failed to develop on the foliage later in season. Apparently checked by a period of drought in July. Indiana: sent in July 27 from Jasper County.

Mosaic (virus). New Jersey, North Carolina, Tennessee, Indiana, Louisiana. From the last-named state, Tims, Edgerton, and Christopher reported as follows:

"Soybean mosaic found quite generally over the cane belt where the Biloxi variety is grown in the rotation. There was not a very high infection percentage, in any one field, approximately 10 to 15 per cent. The disease is apparently more common in the Biloxi than in the Laredo or Otootan variety, and is generally associated with injury from the bean leaf beetle."

Hopperburn caused by leafhoppers. New Jersey.

Recent literature:

1. Lehman, S. G. Studies on bacterial pustule of soy bean. (Abstract Phytopath. 19: 96. Jan. 1929.
Bacterium phaseoli var. sojens.
2. Lehman, S. G. Frog-eye leaf spot of soy bean caused by *Cercospora diazi* Miura. Journ. Agr. Res. 36: 811-833. 1928.

SWEET CLOVER

Cercospora davisii Ell. & Ev., leaf spot. West Virginia on white sweet clover first report to the Survey from this state. Infection slight. (Archer)

Cercospora sp., leaf spot. Causing some defoliation on the Experiment Station Farm in Kentucky (Vallean).

Sweet clover

Corticium vagum Berk. & Curt. Five per cent of plants infected around Ames, Iowa. (J. C. Gilman)

Mycosphaerella lethalis Steno, stem spot. First report to the Survey from West Virginia, on white sweet clover. Infection severe and general; loss for the state a trace. (Archer).

Phymatotrichum omnivorum (Shear) Duggar, root rot. Texas

Stagonospora carpathica Bauenl., leaf spot on white sweet clover. Montana.

Mosaic (virus). Kentucky, Iowa, North Dakota.

Albino plants (undet.) Montana.

Recent literature:

1. Severin, Henry H. P., and Charles F. Henderson. Some host plants of curly top. Hilgardia 3: 339-392. June 1928. Artificial infection.

V E T C H (Vicia spp.)

Ascochyta pisi Lib., leaf and pod spot. North Carolina, caused serious damage.

Kabatiella nigricans (Atk. and Edg.) Karak. (Protocoronospora nigricans Atk. and Edg., Exobasidium viciae Karak.) On V. villosa, Montana.

Mycosphaerella pinodes (Berk. & Blox.) Stone. Delaware.

Phymatotrichum omnivorum (Shear) Duggar, root rot. On joint-vetch, Texas.

Recent literature

1. Severin, Henry H. P., and Charles F. Henderson. Some host plants of curly top. Hilgardia 3: 339-392. June 1928. Artificial infection of V. atropurpurea, V. villosa, V. sativa, V. faba

V E L V E T B E A N

Phymatotrichum omnivorum (Shear) Duggar, root rot. Texas.

Velvet bean

Recent literature:

1. McCulloch, L. *Bacterium stizolobii* (Wolf) comb. nov. syn. *Aplanobacter stizolobii*. *Phytopath.* 18: 460. 1928.

P I G E O N P E A (Cajanus indicus)

Phymatotrichum omnivorum (Shear) Duggar, root rot. Texas.

K U D Z U (Pueraria thunbergiana)

Bacterium puerariae Hedges, bacterial halo spot, was less conspicuous in Georgia in the fall than in former years, although it caused the usual amount of injury in the spring and summer. Loss for the state a trace. Obtained infection of snap beans with the organism. (Boyd)

Phymatotrichum omnivorum (Shear) Duggar, root rot. Texas, very important on this host.

Rhizoctonia sp., leaf blight. Georgia: This "thread blight" was observed in 1926 in a single field, this year occurred in several fields. It caused a 25 per cent loss of foliage in one 15-acre field. Loss for state 0.5 per cent. (Boyd)

Recent literature

1. Hedges, F. Bacterial halo spot of kudzu caused by *Bacterium puerariae* Hedges. *Jour. Agr. Res.* 36: 419-428. Mar. 1, 1928

G R A S S E S

Blast (undet.)

Avena fatua: Montana

Claviceps sp.

Elymus sp.: Montana

Paspalum sp.: Maryland

Claviceps purpurea (Fr.) Tul.

Agropyron repens: Maryland, Pennsylvania.

Phalaris arundinacea: Pennsylvania.

Colletotrichum sp.

Holcus halepensis: Texas.

Grasses.

Colletotrichum graminicolum (Ces.) Wils.

Holcus sorghum sudanensis: Missouri, caused serious losses in many fields. Total loss for state 5 to 10 per cent. (Scott).

Epichloa typhina (Pers.) Tul.

Indiana

Helminthosporium turcicum Pass.

Holcus sorghum sudanensis: Texas.

Phyllachora graminis (Pers.) Fckl.

Agropyron repens: Pennsylvania

Panicum sp.: Ohio

Physarum cinereum (Batsch.) Pers.

Poa sp. and other grasses: New Jersey, several reports of its causing injury to lawn grass in patches. (Dept. Pl. Path.)
Ohio, very prevalent and unsightly in vicinity of Cincinnati (Wilson)

Piricularia grisea (Cke.) Sacc.

Chaetochloa italica (millet): Delaware.

Chaetochloa viridis: Indiana

Syntherisma sanguinalis: New Jersey

Puccinia epiphylla Wetts. (*P. poarum* Niels.)

Poa pratensis: Montana

Puccinia glumarum (Schm.) Eriks. & Henn.

Agrostis alba: Montana (Cereal Courier 20: 193.)

Puccinia graminis Pers.

Agropyron repens: Wisconsin, Minnesota (Cereal Courier 20: 212, 191.)

Agrostis alba: Wisconsin (Cereal Courier 20: 212)

Hordeum jubatum: Wisconsin, Minnesota (Cereal Courier 20: 191, 212)

Phleum pratense: West Virginia, Montana, Wyoming, Washington.

Puccinia purpurea Cke.

Holcus halepensis: Texas

Rhizoctonia sp. (brown patch)

Agrostis sp.: New Jersey.

Sclerospora graminicola (Sacc.) Schroet.

Chaetochloa sp.: Montana, Wyoming

Chaetochloa italica: South Dakota, Montana, Wyoming

Chaetochloa viridis: Pennsylvania

Sclerotium rhizodes Auers.

Widespread and destructive on hay crop in Massachusetts. (Davis)

Grasses

Scolecotrichum graminis Eckl.

Dactylis glomerata: New York

Poa pratensis: West Virginia

Septoria bromi Sacc.

Bromus inermis: Montana

Sphaceloteca sorghi (Lk.) Clint.

Hilcus halepensis: Texas

} see ERRATA p. 420

Ustilago bromivora (Tul.) Fisch.

Bromus tectorum: Montana, Washington

Ustilago neglecta Niessl

Chaetochloa lutescens: Maryland.

Ustilago rabenhorstiana Kuhn

Syntherisma sanguinalis: New Jersey

Ustilago striaeformis (West.) Niessl

Dactylis glomerata: New York

Phleum pratense: Pennsylvania

Recent literature:

1. Allen, R. F. A cytological study of *Puccinia glumarum* on *Bromus marginatus* and *Triticum vulgare*. Jour. Agr. Res. 36: 487-513. Mar. 15, 1928.
2. Caldwell, Ralph M. Preliminary results from cross inoculation and culture studies upon the fungus *Rhynchosporium secalis* (Oud.) Davis causing scald of cereals and other grasses. (Abstract) Phytopath. 19: 104. Jan. 1929.
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4. Davis, W. H. Reaction in agronomic strains of timothy to *Ustilago striaeformis* (West.) Niessl. (Abstract) Phytopath. 19: 105. Jan. 1929.
5. Drechsler, C. Zonate eyespot of grasses caused by *Helminthosporium giganteum*. Jour. Agr. Res. 37: 473-492. O. 15. 1928.
6. Durrell, L. W. Smuts of Colorado grains. Colorado Agr. Exp. Sta. Bul. 334. 24 pp. Feb. 1928.
Ustilago crameri on *Chaetochloa italica*.
7. Fenaroli, L. Un nouvel hôte de l'*Ustilago ischaemi* Fuck. Bull. Soc. Mycol. France. 43: 43: 280-281. Ja. 1928.
Andropogon distachyum L.

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12. Monteith, J. Jr. Fall treatments for snow-mold. Bull. U. S. Golf Assoc. Green Sect. 8: 192-193. Sept. 1928.
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14. Nisikado, Y. Leaf blight of *Eragrostis major* Host., caused by *Ophiobolus kusanoi* n. sp., the ascigerous stage of a *Helminthosporium*. Japan. Jour. Bot. 4: 99-112. 1928.
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SUNFLOWER

Phymatotrichum omnivorum (Shear) Dug., root rot. Texas

Plasmopara halstedii (Farl.) Berl. and De Toni, downy mildew.

Montana. Young, Jellison, and Morris (5) have obtained evidence that the fungus overwinters by means of oospores in sunflower refuse in the soil instead of being seed-borne as indicated in previously published statements (1, 4, 6).

Puccinia helianthi-mollis (Schw.) Jack., rust. New Jersey, Kansas, Montana, California. In Kansas, according to C. O. Johnston, rust was very severe on the large cultivated sunflower and nearly all wild sunflowers.

Sclerotinia sclerotiorum (Lib.) Masee, stem rot, wilt. Maine, Montana, Washington. The report for Maine seems to be the first for that state. Donald Folsom reported that the fungus attacked the stems at various distances above the soil in a college field grown for silage at Orono.

Septoria helianthi Ell. & Kell., leaf spot. West Virginia: Infection of giant sunflower was severe and general. Commonly half of the leaves were killed and frequently in southern localities plants were killed. (Archer Also reported from Montana.

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